The Dissertation Committee for Yi-Cheon Yim certifies that this is the approved version of the following dissertation:

THE CONSUMER MEDIA EXPERIENCE IN INNOVATIVE MEDIA:
THE IMPACT OF MEDIA NOVELTY AND PRESENCE
ON CONSUMER EVALUATIONS

Committee:

_____
Vincent J. Cicchirillo, Supervisor

_____
Minette E. Drumwright, Supervisor

_____
Edmund T. Emmer

_____
Brian D. Till

_____
Jerome D. Williams

THE CONSUMER MEDIA EXPERIENCE IN INNOVATIVE MEDIA: THE IMPACT OF MEDIA NOVELTY AND PRESENCE ON CONSUMER EVALUATIONS

by

Yi-Cheon Yim, B.A.; M.S.

Dissertation

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Doctor of Philosophy

The University of Texas at Austin

August 2011

Dedication

This dissertation is dedicated to my mother, Ms. Ta-Yeon Park, my parents-in-law, Mr. Young-Man Park and Ms. Gae-Ok Song, my son, Philip Yim, and finally my wife, Ms. Sun-Young Park.

Acknowledgements

I am very grateful for the encouragement and guidance I received from my dissertation committee members. Without their support, this dissertation would not exist.

I would like to thank my dissertation advisors, Dr. Drumwright and Dr. Cicchirillo, for their constant support, patient guidance, and confidence in me. They always made time for me and gave me feedback despite their extremely busy schedules. They helped me grow and mature as a researcher and supported me through some of the toughest moments in my life. Dr. Drumwright sets an unparalleled example as an academic and mentor that I can only aspire to follow one day, and Dr. Cicchirillo provided me with advanced knowledge and highly detailed directions in my study. They were wonderful role models to me and will definitely influence my personal and academic career in many ways.

Dr. Emmer, Dr. Till, and Dr. Williams deserve my heartfelt thanks. They have spent a great deal of time reading and commenting on drafts and helping me improve this dissertation. I have been fortunate to gain from their great experience as researchers, teachers and members of the academic community.

Again, I would like to take this opportunity to express my appreciation to my advisors and all my committee members for their valuable advice and support with this dissertation.

THE CONSUMER MEDIA EXPERIENCE IN INNOVATIVE MEDIA: THE IMPACT OF MEDIA NOVELTY AND PRESENCE ON CONSUMER EVALUATIONS

Publication No. _____

Yi-Cheon Yim, Ph.D.
The University of Texas at Austin 2011

Supervisors: Minette E. Drumwright and Vincent J. Cicchirillo

The purpose of the study was to provide a comprehensive framework that explains how consumer experiences within new, innovative media affect advertising effectiveness. Several concerns about previous advertising models motivated this study. For instance, advertising models traditionally have focused on message recipients' characteristics and information processes, ignoring the significant role of media in understanding advertising effectiveness. In addition, recently developed advertising models dealing with the impact of media have been narrowly applied to a specific medium, the Internet, and have focused largely on interactivity.

The proposed model and our findings highlighted the prominent roles of media novelty and presence in enhancing advertising effectiveness in an innovative, new medium that emphasizes vividness, stereoscopic 3-D. The novelty effect, created by the newness of the medium, had the power to attract viewers' attention and the increased

attention enhanced their sense of presence, the experience of being plunged into a new virtual world that advertisers constructed. The findings demonstrated that these sequential relationships can result in positive measures of advertising effectiveness, such as improved product knowledge and increased enjoyment, and ultimately more favorable attitudes toward the ad. Also our findings revealed that an irritation, such as cybersickness resulting from the stereoscopic 3-D, can hinder ad viewers' communication processes and reduce their attention to the ad and their enjoyment of it. The model predicted that user characteristics, such as innovativeness, curiosity, and previous experience with the medium, would affect the process, but no effects were found.

The current research provided advertising practitioners and researchers with opportunities to consider the significant role of media, especially innovative media, in assessing overall advertising effectiveness. For managers, it highlighted the potential of stereoscopic 3-D technology as an emerging advertising vehicle. Given the rapid changes in the media environment, it is increasingly important to understand the important roles that media play in advertising effectiveness.

Table of Contents

List of Tables ……...xiii

List of Figures ……ix

CHAPTER 1: Introduction ……1

CHAPTER 2: Consumer Media Experience ……...8

Media Novelty ……..8

Measuring Media Novelty ……10

Impact of Media Novelty ……...11

Consumer Traits in Response to New Innovative Media ……...12

Curiosity ……13

Innovativeness ……...15

Presence ……..17

Virtual Reality ……...17

Defining Presence ……18

Typologies of Presence ……19

Presence and Attention ……20

Presence and Irritation ……..21

Interactivity ……...23

Vividness ……...25

Presence as a Marketing Communication Tool ……28

Impact of Presence: Enjoyment ……..29

Impact of Presence: Consumer Learning ……32

Summary of Hypotheses and Conceptual Map ……...37
CHAPTER 3: Methodology ……..39
General Methodology ……39
Devices ……..40
Measures ……...40
Measures – Pretest ……..41
Curiosity ……41
Innovativeness ……41
Product Involvement ……42
Previous Media Experience ……..42
Demographic Information ……43
Measures – Posttest ……43
Media Novelty ……..43
Presence ……43
Attention to Media ……44
Irritation ……44
Enjoyment ……44
Product Knowledge ……...45
Consumer Responses ……45
CHAPTER 4: Analysis and Results ……..46
Pilot Study ……...46
Stimuli ……...46

Participants ……47

Procedures ……48

Results ……...48

Main Experiment ……51

Participants ……51

Stimuli ……...52

Manipulation Check ……..53

Results ……53

Comparisons of Stereoscopic 3-D and 2-D Advertising ……...54

Pre- vs. Post Attitude Changes in the Responses to the KFC Ad ……57

Testing the Proposed Model ……58

Model Based on 3-D Condition ……..58

Moderating Effect of Innovativeness/Curiosity ……58

Assumption Check ……59

Testing the Model ……60

Model Based on 2-D Condition ……..61

Assumption Check ……62

Testing the Model ……63

Model Based on Combined Samples ……..64
from 3-D and 2-D Conditions

Reliability and Validity ……65

Assumption Check ……65

Testing the Model ……66

CHAPTER 5: Discussion and Conclusion ……69

Discussion ……...69

Stereoscopic 3-D Display as a Tool …….....70
to Prompt Advertising Effectiveness

The Contributions of Consumer Media Experience Model ……..72

Alternative Explanations for Insignificant Hypotheses ……75

Limitations and Future Research ……78

Conclusion ……..80

Appendix A: Scale Items ……..82

References ……86

Vita ……..104

List of Tables

Table 1: Summary of Hypotheses …….37

Table 2: Demographic Information for Pilot Study Participants ……..48

Table 3: Reliability and Validity in Measures ……..49

Table 4: Testing Stimuli of Stereoscopic 3-D and 2-D Advertising …….50

Table 5: Demographic Information for Main Study Participants …….51

Table 6: Comparisons of Stereoscopic 3-D and 2-D Advertising in *t*-Test …..……55

Table 7: Comparisons of Stereoscopic 3-D and 2-D Advertising ……56
in MANOVA

Table 8: Repeated Measures of Attitude Changes in KFC ……...57

Table 9: Summary of Model Testing Results ……...……68

List of Figures

Figure 1: Flow Zone Factors ……15

Figure 2: Technological Variables Influencing Presence ……27

Figure 3: Integrated Information Response Model ……...33

Figure 4: Typology of Human Experience for the Study of Presence ……..34

Figure 5: Model of Consumer Media Experience ……38

Figure 6: Miracube 32-inch Stereoscopic 3-D Monitor ……40

Figure 7: Stimuli – Stereoscopic 3-D Ads for Fast Food and Cellular Phone ……..47

Figure 8: Stimuli by Product Category ……..52

Figure 9: Testing Moderating Effects of Curiosity and Innovativeness ……...58
in 3-D Condition

Figure 10: Testing the Model Based on 3-D Condition ……61

Figure 11: Testing Moderating Effects of Curiosity and Innovativeness ……62
in 2-D Condition

Figure 12: Testing the Model Based on 2-D Condition ……63

Figure 13: Testing Moderating Effects of Curiosity and Innovativeness ……64
in 3-D and 2-D Conditions

Figure 14: Testing the Model Based on 3-D and 2-D Conditions ……66

Figure 15: Sample Distributions of "Previous Media Experience" ……..77

CHAPTER 1: Introduction

Scholars and advertisers have long been challenged to explain how advertising works. Reflecting the difficulty of reaching a conclusive answer, many attempts have been made from diverse perspectives. Prior traditional, integrative advertising models focused on the message recipients' characteristics and information processes, such as motivation, ability, cognitive and affective processes (e.g., MacInnis and Jaworski 1989; Petty and Cacioppo 1981; Vakratsas and Ambler 1999; Zajonc 1980), subconscious processes (e.g., Grunert 1996; Krugman 1965, 1977), involvement (e.g, Greenwald and Leavitt 1984; Krugman 1977; Vaughn 1980), persuasion knowledge (e.g., Friestad and Wright 1994), and judgment correction (e.g., Meyers-Levy and Malaviya 1999).

However, recent advertising models have tended to pay more attention to advertising effectiveness within the context of media. This may be because today's media provide consumers with more diverse and stronger media experiences, which refer to media users' cognitive and affective perceptions while using media (Koppe 1998; Malthouse, Bobby, and Eadie 2003). Specifically, in contrast to passive traditional media, the Internet enables media users to interact actively with content and other users, providing useful information and social relationships (Cho 1999; Hoffman and Novak 1996). High definition televisions, which are superior to standard definition televisions in terms of image quality, allow users to immerse themselves in content (Bracken 2005). Handheld portable media devices (e.g., iPhone, iPad) provide users with convenience and enjoyment in that they are easy to carry and offer many entertainment and information

applications (e.g., games and videos) (Ivory and Magee 2009). As such, each medium with its different functional features provides users with a different media experience, and therefore, each medium may result in different advertising effects (Bronner and Neijens 2006; Bronner, Velthoven, and Kuijpers 2005).

Prompted by the changing media environment, more diverse integrated models have been proposed. However, these models have some limitations in that they have been somewhat narrowly applied to a specific medium, the Internet. Furthermore, they have emphasized the functional media feature of interactivity, generally suggesting that highly interactive media elicit more positive consumer evaluations of advertising (e.g., Briggs and Hollis 1997; Cho 1999; Jee and Lee 2002; Maddox, Mehta, and Daubek 1997; Macias 2003; Rodgers and Thorson 2000). For example, Ko, Cho, and Roberts' interactive advertising model (2005) revealed that the media property of interactivity links users' motivations for information, convenience, and social interaction to attitude towards a company's Web site. As another example, Macias (2003) presented a model explaining that interactivity has a positive effect on consumers' attitudes towards and comprehension of interactive Internet advertising. Given the rapidly changing media environment that extends beyond the Internet, another model with a focus on the general media experience is needed to assess advertising effectiveness more appropriately.

The current study examines several key components that may significantly affect consumer media experiences within the context of emerging new media (e.g., stereoscopic 3-D and hologram) and proposes an integrative model explaining how diverse new media experiences are associated with consumer responses.

The model assumes that the consumer media experience is constructed based on four primary factors; media novelty, attention, presence, and irritation. Media novelty is briefly described as the novel effects caused by media alone, excluding any content effects (e.g., messages and designs). We expect that the dominant effects of a new medium in the early stage are caused by users' perceptions of its newness and uniqueness as distinguished from previous conventional media (Brown 2002; Constantin and Grigorovici 2004; Edwards and Gangadharbatla 2001; Grigorovici and Constantin 2004; Hirschman 1980; Jeandrain 2001; Schweizer 2006). Previous research has documented that novelty has the power to attract a consumer's attention, which leads to an immersive media experience, and in turn generates positive advertising effects (Brown 2002; Kover and James 1993; Wilson and Rolls 1993). Attracting consumers' attention is one of the primary goals of advertising in that it provides the opportunity to persuade ad viewers and improve their recall and recognition, and therefore, it has been considered a very important outcome measure in advertising research (Carver and Scheier 1981; Donohew et al. 2002; Rosbergen, Pieters, and Wedel 1997).

The role of presence also must be considered in understanding how an innovative new medium induces advertising effects, since ad viewers' attention is directly associated with the level of presence (Barfield et al. 1995; Fontaine 1992; Lombard and Ditton 1997; Witmer and Singer 1998). Presence is defined as "a psychological state in which virtual (para-authentic or artificial) objects are experienced as actual objects in either sensory or nonsensory ways" (Lee 2004, p. 36). It can be explained as a sense of being situated in one place, while actually

being physically situated in another place (Witmer and Singer 1998). The primary components constituting presence are interactivity and vividness (i.e., realness, realism, or richness); interactivity is described as a collection of actions and reactions between a media user and mediated objects, while vividness refers to the ability of a technology to describe a rich, mediated environment (Steuer 1992; Sheridan 1992). Presence serves a mediating role in generating diverse advertising effects; it evokes arousal, involvement, and persuasion in terms of attitudes toward advertising, attitudes toward the brand, and purchase intentions (Daugherty, Li, and Biocca 2005; Grigorovici and Constantin 2004; Klein 2003; Lombard and Ditton 1997; Nelson, Yaros, and Keum 2006).

Importantly, today's technological advancement is not only focused on interactivity, but it also involves producing more realistic visualizations that stimulate vividness (e.g., bigger size of screen, LED TV, Blue-ray, HD TV, stereoscopic 3-D). A model adopting the concept of presence, including both interactivity and vividness, would be useful in identifying advertising effects distinguishing old and new media. Furthermore, the recent literature in the domain of virtual reality has often indicated that the concept of presence is not limited to computer-mediated media, such as video game and online 3-D visualizations. Rather, presence has also been examined in research dealing with multiple types of media, such as television, books, and magazines, since presence is created based on users' psychological states and perceptions (Kim and Biocca 1997; Lombard and Ditton 1997; Towell and Towell 1997). Therefore, the

proposed model adopting presence is expected to be applicable to any type of new media in both virtual and non-virtual environments.

Finally, the model includes a consideration of how irritating factors in a media experience affect consumer responses to advertising. In this study, irritation is defined as any type of media property that hinders consumers' advertising communication process. Irritation generally diminishes consumers' attention to advertising and the overall advertising effects (Aaker and Bruzzone 1985; Duncan and Nelson 1985; Ducoffee 1996). Similarly, irritation is expected to produce a negative impact on the advertising communication process, even within new media environments (e.g., DuCoffee 1996). However, the irritation in the current model is caused by the medium's technological shortcomings, not by causes focused on in prior research, such as content factors (e.g., Aaker, Stayman, and Vezina 1988; Barling and Fullagar 1983) and viewing context (e.g., Broach, Page, and Wilson 1995; Goldberg and Gorn 1987). As such, the model can be used to explain advertising effectiveness as reflected by media characteristics.

Taking all the factors together, the proposed model intends to explain advertising effects through assessing consumers' experience with new media, describing a sequential relationship among media novelty, attention, and presence, while considering the negative impact of irritation on this communication process. Additionally, consumer traits, such as previous media experience, curiosity, and innovativeness, are considered in this model, since advertising effects can be

estimated more appropriately when considering both media and user characteristics (Li, Daugherty, and Biocca 2002).

To test this model, advertising embedded within stereoscopic 3-D technology is employed. Stereoscopic 3-D advertising is defined as computer-simulated advertising that allows consumers to experience floating three-dimensional visualizations of the product that have a true depth (popup images off screen). This medium is assumed to be new to many people and is considered to be at an early stage of adoption in advertising (Yim and Daugherty 2008), yet it is viewed as having high potential as an advertising tool in the near future (Contrino 2009; Johnson 2009; Reuters 2009; United Press International 2009).

The proposed model is an attempt to extend both theoretical and practical explanations for the systematic mechanisms regarding how consumers' media experiences are constructed and their relation to advertising effectiveness within new, innovative media. That is, the model is expected to allow marketers and advertisers to estimate the potential impact of new, upcoming media on advertising effectiveness. Given that new, technology-based media will continuously emerge in the near future (e.g., 3-D hologram), this is an important undertaking. Furthermore, the model tested in this study directly examines the working processes of stereoscopic 3-D advertising, which can be adopted in diverse media settings, such as television commercials, cinema advertising, and online product visualization. Finally, the current study anticipates adding knowledge to consumer media psychology, especially in new, innovative media

environments, since the model examines the relationship between the individual personality factors and users' media experiences.

CHAPTER 2: Consumer Media Experience

The model proposes that four primary factors – media novelty, attention, presence, and irritation – are at the core of consumer media experience within new media environments. Media novelty attracts consumers' attention to media and is linked to the concept of presence; that is, the model considers consumer attention to media as a mediating variable between media novelty and presence. Presence, in turn, elicits improved product knowledge and enjoyment from consumers. In addition, the model explains how irritating factors resulting from the shortcomings of media are related to these variables. Finally, the model addresses the relationship between consumer traits and the media experience. For an overview of the model, see Figure 5 at the end of this chapter.

In this chapter, the first section deals with media novelty, its operational meaning and its power to attract consumers' attention. The second section focuses on consumer characteristics that are expected to be particularly important in the context of new media – curiosity and innovativeness. The final section deals with presence and the related concepts.

MEDIA NOVELTY

Massetti (1996, p. 87) operationally defined novelty as "the extent to which each response was rated as new, unique, and different." Berlyne and his colleagues (1963) viewed novelty as the combined attributes of new or unusual stimuli. In a similar vein, Rosenkrans (2009) described novel adverting as advertising whose stimuli and design are

unique, different, or unusual when compared to other ads. As these definitions indicate, the concept of novelty is semantically constructed based on the meanings of new, unique, different, and unusual. In addition, some propose that the concept of novelty corresponds to the degree of distinction between current thoughts and past experience, and it incorporates the role of time (Pearson 1970). That is, the degree to which a stimulus is novel depends on people's perceived experiences and memory; therefore, familiarity is the antithesis of novelty (Welker 1961). Similarly, the concept of creativity semantically shares some common meanings with novelty. The definition of creativity in much of the advertising literature typically involves novelty, newness, originality, and appropriateness (Ang and Low 2000; Haberland and Dacin 1992; Kilgour 2006; West, Kover, and Caruana 2008; White and Smith 2001).

However, in the prior advertising literature, novelty has often been limited to the effects of creativity or content-based novelty (ad content) (e.g., Blasko and Mokwa 1986; Till and Baack 2005). Given that the emerging new media include more diverse and stronger media effects, isolating media novelty effects from overall advertising novelty effects is necessary to enhance our understanding of advertising effectiveness within the context of new media (e.g., Nysveen and Breivik 2005). For example, Yim and Daugherty (2009) investigated the effectiveness of auto-stereoscopic 3-D advertising, which refers to stereoscopic 3-D advertising that does not require viewers to wear glasses to experience 3-D visualizations. They identified that this new medium has stronger effects in generating positive attitudes towards advertising and the advertised brand and more favorable purchase intentions than 2-D advertising, while controlling the quality of

advertising content (Yim and Daugherty 2009). They concluded that new media itself is likely to elicit diverse positive marketing communications.

Consistent with this idea, some have insisted that the effects of new media are often caused by media novelty effects (e.g., Edwards and Gangadharbatla 2001; Grigorovici and Constantin 2004; Jeandrain 2001). For example, Brown (2002) compared traditional banner ads with banner ads using pull-down menus, and he found evidence that the newer format elicited more positive consumer evaluations in terms of attention, liking, persuasion, and intention to click, and he insisted that the positive feedback from participants was due to novelty effects. Edwards and Gangadharbatla (2001) echoed the critical role of the novelty effect in generating consumer purchase intention. Therefore, in keeping with the concept of novelty, creativity, and prior literature on media effects in advertising, media novelty is defined as the overall evaluation of a medium itself based on users' perceptions of its newness and unusualness.

Measuring Media Novelty

Because media scholars only recently have come to recognize the importance of the novelty effect in advertising research, few measures of media novelty have been introduced. The most frequently used approach to measuring novelty has been to ask participants about their familiarity with a given medium (e.g., Brown 2002; Edwards and Gangadharbatla 2001). However, when considering the constructs used in the conceptual definition of novelty, such as new, unique, different, and unusual, the antithesis of each word does not correspond to the antithesis of familiarity, in terms of a seminal perspective. Specifically, the opposite of new is not unfamiliar, but old, and similarly,

unfamiliar is not equal to not unique or not different. Therefore, a new way to identify participants' perceived media novelty is required.

Impact of Media Novelty

The most dominant effect of novelty in information processing is its power to draw attention from the audience (Kover and James 1993; Lang 2000; Thorson and Lang 1992). The human psychological response to novel stimuli appears to be innate, as infants at a very early age typically tend to engage with novel stimuli (Flavell 1977). Cue-utilization theory (Easterbrook 1959) explains that an unexpected or unusual sensory stimulus (e.g., sound and scene) shakes people's stable cognitive flow and it leads them to experience high arousal, resulting in focused attention on the stimuli, while ignoring other stimuli. In contrast, a familiar stimulus does not have functional cues to affect people's cognitive processes, which only causes low arousal, leading to low selectivity or low attention. Similarly, Lang's limited capacity model (2000) proposes that since human cognitive resources are limited, selective attention is required for efficient cognitive processes via the stages of encoding, storage, and retrieval. While this process is performed, a novel stimulus initiates an automatic selection process, which leads one to attend cognitively to the stimuli. This has often been referred to as an "orienting response," which can cause an automatic allocation of cognitive resources to encode and process sensory information (Lang 2000). Therefore, we assume that advertising messages conveyed via a medium with high novelty may attract more attention from ad viewers than messages conveyed via a medium with low novelty.

> H1: Ad viewers who perceive a higher level of media novelty will pay greater attention to media (i.e., stereoscopic 3-D advertising).

However, new, innovative media are expected to benefit as marketing communication tools due to their novelty effects, but they have a serious shortcoming, which involves consumer habituation to media (Rethans, Swasy, and Marks 1986; Sawyer 1981; Tellis 1997). The habituation-tedium theory of advertising response (Sawyer 1981) proposes that the tension and uncertainty created by advertising novelty wears out, as users are repeatedly exposed to and become familiar with the new advertising. It leads users to be habituated with the ad (habituation), creating positive effects, but simultaneously, it causes boredom with the ad (tedium), resulting in negative effects. The theory also asserts that since the pace of consumer tedium is faster than the pace of habituation, the positive effect from habituation eventually has no positive impact as repetitions and the related tedium increase.

As such, when considering that media novelty originates from the conceptual inconsistency between a viewer's current expectation and past experience with media, the increased time spent on media uses – in other words, increasing media familiarity – will reduce the gap between the two, resulting in a weaker media novelty effect. That is, in the context of stereoscopic 3-D, participants familiar with this medium are assumed to experience less media novelty.

> H2a: Ad viewers who have previously experienced media (i.e., stereoscopic 3-D advertising) will perceive decreased media novelty.

CONSUMER TRAITS IN RESPONSE TO NEW INNOVATIVE MEDIA

Although many factors that affect the perceived media experience are created by technological functions, some consumer traits are also believed to play moderating roles

in enhancing the overall media experience. In this section, in addition to previous media experience, two other factors that are assumed to be critical human factors moderating the effectiveness of advertising in new, innovative media – curiosity and innovativeness – are discussed.

Curiosity

Curiosity is a frequently investigated aspect of basic human natures, and varying perspectives on curiosity have been asserted, dating back to ancient times. For example, Cicero viewed curiosity as "innate love of learning and of knowledge," or "passion for learning" (Cicero 1914, p. 48). As Cicero's definition reflects, curiosity has long been recognized as an important motivation that affects human behavior in terms of knowledge development and exploratory behavior (e.g., Day 1982; Loewenstein 1994). In contrast, anxiety reduction theory (White 1959) explains that curiosity, which is a personality trait, motivates people to investigate novel, complex stimuli or activities that induce uncertainty or tension in order to alleviate psychological discomfort (Berlyne 1960; Loewenstein 1994). Yet another perspective interprets the motivation for curiosity as a type of intrinsic reward that fulfills an individual's desire to supplement knowledge, resulting in pleasantness (Csikszentmihalyi 1990; Deci 1975; Watson et al. 1999).

Despite the conflicts, the views of curiosity mentioned above support the notion that curiosity motivates exploratory behavior (e.g., Berlyne 1954, 1960, 1966; Kashdan, Rose, and Fincham 2004; Spielberger and Starr 1994; Voss and Keller 1983). Similarly, Litman and Spielberger (2003, p. 75) asserted that exploratory behavior is an outcome of curiosity, defining curiosity as "a desire for acquiring new knowledge and new sensory

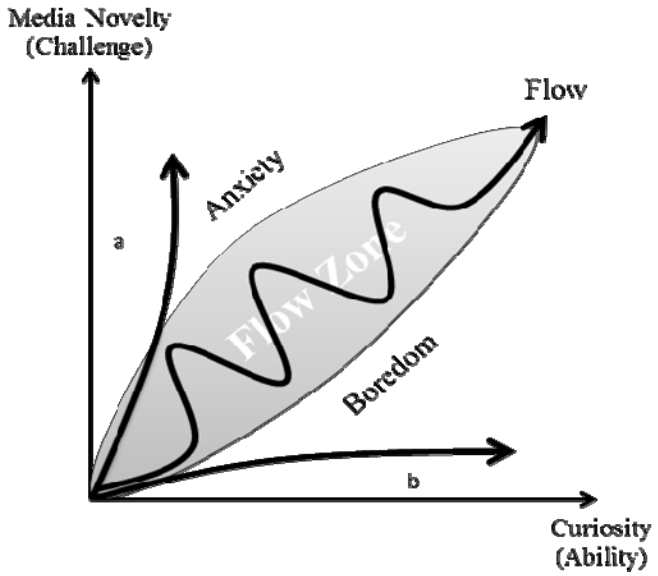
experience that motivates exploratory behavior." The exploration to seek a variety of new and novel stimuli is likely to alleviate boredom and allow people to experience new changes and enjoyment (Steenkamp and Baumgartner 1992).

Another dimension of curiosity includes its ability to let people allocate attention to and become absorbed in specific novel stimuli or activities (Kashdan, Rose, and Fincham 2004). According to Deci and Ryan (1985), curiosity is interchangeable with an individual's interest, since both have the power to attract one's attention to specific stimuli or activities. Similarly, Fredrickson (1998) linked curiosity to attention observed during a psychological state of flow. Flow is explained as a state of being fully immersed with challenging activities, especially when one's perceived skills (abilities) are congruent with the perceived challenges of that activity, resulting in increased attention (Csiksentmihalyi 1990; Kashdan, Rose, and Fincham 2004). Applying this idea to the current model, when an individual who has an optimal level of curiosity encounters an object that has an enough novelty to stimulate his curiosity (i.e., novel medium), his attentional investment to stimuli or activities will be maximized (see Figure 1). More specifically, when people low in curiosity encounter a medium with high novelty, they may not pay much attention to it and may feel anxious about it (due to its complexity) (e.g., a in Figure 1). In contrast, when people high in curiosity are exposed to a medium with low novelty, they may feel bored with it (e.g., b in Figure 1). As such, Hoffman and Novak (1996) revealed that the experience of flow on the web was optimal when users' web skill matched the level of challenge they encounter while using web. Therefore, it is

assumed that an individual's curiosity serves to moderate the impact of media novelty on attention to media.

> H2b: When ad viewers perceive greater media novelty, those with greater curiosity will pay more attention to media (i.e., stereoscopic 3-D advertising).

Figure 1: Flow Zone Factors (Csikszentmihalyi 1990)



Innovativeness

Rogers and Shoemaker (1971, p. 27) defined innovativeness as "the degree to which an individual is relatively earlier in adopting an innovation than other members of his social system." As the definition indicates, their approach accentuates the importance of time-of-adoption for new innovations (e.g., idea, product, technology, and information), which interprets innovativeness as a temporal phenomenon, and emphasizes the importance of interpersonal influence. On the other hand, Midgley and Downling (1978, p. 236) perceived the notion of innovativeness as "the degree to which

an individual is receptive to new ideas and makes an innovation decision independently of the communicated experience of others." They viewed innovativeness as a part of a personality trait that is a persisting characteristic individuals may hold (Wolman 1989), suggesting "innate innovativeness." These two approaches have received support as well as criticism from other scholars due to some theoretical and methodological weaknesses, but the underlying idea of both approaches commonly implies the close relationship between innovativeness and seeking newness, changes, and novel experiences (Hirschman 1980; Roehrich 2004).

Rogers (1962) identified innovators as those who first adopt ideas or objects perceived as new by members of a social group. Innovators are more willing to try novel products and experiences than others (Flynn, Goldsmith, and Eastman 1996; Lyons and Henderson 2005; Shoham and Ruvio 2008; Turnbull and Meenaghan 1980) and are knowledgeable about specific topics (Myers and Roberts 1972). In addition, this group is demographically younger, better educated, and with higher incomes than others (Gatigonon and Robertson 1985; Rogers and Shoemaker 1971); therefore, it is plausible that innovativeness is a socially learned personal trait, rather than an innate characteristic (Hirschman 1980).

Innovators' motivation to seek information is somewhat different from the motivation of others. Specifically, while some people (with lower innovativeness) communicate primarily to gather information needed to reduce the risk in decision-making (Katz and Lazarsfeld 1955), innovators (with higher innovativeness) obtain information for personal satisfaction and to achieve authority. Innovators are motivated

by emulation and competition and the result is that they achieve superiority in terms of knowledge and experiences (Block, Sherrell, and Ridgway 1986; Feick and Price 1984; Veblen 1899).

Therefore, highly innovative people are assumed to be more interested in and pay more attention to new and unusual novel stimuli, once the novelty in the stimuli is high enough to satisfy their desire for new experiences. That is, it is anticipated that when innovative people perceive enough media novelty, their attention to media will be increased (to fulfill their desire for new knowledge and experiences).

> H2c: When ad viewers perceive greater media novelty, those with greater innovativeness will pay more attention to media (i.e., stereoscopic 3-D advertising).

PRESENCE

Since the concept of presence includes both dimensions of interactivity (e.g., the Internet) and vividness (e.g., HDTV), it is useful to examine diverse media formats. This section discusses the concept of presence and how it affects consumer media experiences. Additionally, the concept of virtual reality is introduced, since the construct of presence has been adopted to explain it.

Virtual Reality

Rheingold (1991) defined virtual reality as a personal experience surrounded by a computer-generated representation that allows media users to see and to move freely in the virtual world. Similarly, Biocca's (1992, p. 23) definition of virtual reality is "the environment created by a computer or other media, an environment in which the user feels present." Yet, Steuer (1995) pointed out the limitation of these definitions, since he

believed that all the experiences obtained through mediated channels, whether print or digital, can provide a virtual experience; thus virtual reality is not limited to computer-based media only. For example, people can have a virtual experience through reading a book or playing a video game, in that both activities are mediated experiences (Lee 2004; Towell and Towell 1997).

From this perspective, Steuer (1995, p. 37) extended the definition of virtual reality as "a real or simulated environment in which a perceiver experiences presence," since previous definitions involved technological hardware. The important assumptions underlying this definition are that the experiences obtained in virtual reality are mediated and perceived experiences of para-authentic reality (Lee 2004; Lombard et al. 2000a; Steuer 1992; Zahorik and Jenison 1998). This means that any non-mediated experience should be excluded from virtual reality research, and media users may have different levels of immersive virtual experiences due to individual traits that affect their perceptual processes (Lee 2004; Li, Daugherty, and Biocca 2002; Towell and Towell 1997). Therefore, virtual reality research needs to be concerned with both human and technological factors in measuring effectiveness.

Defining Presence

Some scholars have focused upon a psychological perspective of human experience, while others have paid attention to the technological aspect in defining a sense of presence (Sadowski and Stanney 2002). One widely accepted definition of presence is a psychological state of being situated in one place, while actually physically being situated in another place (Witmer and Singer 1998). Lee's (2004) recent efforts to

explicate presence define it as "a psychological state in which virtual (para-authentic or artificial) objects are experienced as actual objects in either sensory or nonsensory ways" (p. 36). Analogously, Lombard and Ditton (1997, p. 2) suggested that presence be described as "a perceptual illusion of nonmediation." These definitions commonly share the idea that presence occurs when media users perceive illusions as if they physically exist, without noticing the existence of technology in creating the experience.

Typologies of Presence

There have been many attempts to detail the typologies of presence. For example, Heeter (1992) suggested three types of presence: environmental presence, referring to the extent to which the environment itself (e.g., system, content) identifies one's existence and reacts to him/her; social presence, referring to the extent to which one senses other beings and reacts to them; and personal presence, referring to the extent to which one feels present in virtual environments. In a similar vein, Biocca (1997) also proposed three types of presence: physical (a sense of being located in a virtual world), social (a sense of being together with others in a virtual world), and self presence (a sense of recognizing one's self in a virtual world). Later, Lee (2004) combined previous scholars' classifications to create a classification with three categories: 1) physical (a sense of experiencing objects as if they are actual), 2) social (a sense of experiencing virtual social actors as actual ones), and 3) self presence (a sense of experiencing the virtual self as the actual self). Considering the various types of presence, stereoscopic 3-D advertising appears to be closely associated with physical presence since it typically involves

displaying a commercial product. That is, one experiences the advertised products as if they were real.

Presence and Attention

Presence is a psychological symptom that occurs when one's attention is more oriented towards virtual environments than toward one's external physical or mental environment (Barfield et al. 1995; Fontaine 1992; Lessiter et al. 2001; Lombard and Ditton 1997; Kim and Biocca 1997; Witmer and Singer 1998). Here, attention denotes orienting users' senses towards virtual or mediated environments that technology creates to receive information selectively from an information provider (Witmer and Singer 1998). Many scholars have noted that experiencing a sense of presence is similar to the process of selective attention to virtual environments. Since human cognitive sources are limited, people tend to allocate them to one meaningful or interesting aspect of the environment and selectively process that information (Lang 2000; Triesman 1964). As such, the process of sensing presence requires users to have the ability to attend selectively to the stimuli shown in the virtual environments and to exclude the external (physical) and internal (mental) environments (Fontaine 1992; McGreevy 1992; Witmer and Singer 1998). Thus, it is assumed that presence is generated based on media users' continuous attention that allows them to be involved within and be connected with the virtual environments.

> H3: Ad viewers who pay a higher level of attention to media (i.e., stereoscopic 3-D advertising) will perceive a greater sense of presence.

Presence and Irritation

Media users' attention to the stimuli created within the virtual environments leads users to be involved in meaningful activities in virtual environments (Biocca 1997). Involvement indicates how much users are integrated with the stimuli and activities in the virtual environments, and the extent to which involvement can be generated is associated with the increased sense of presence (Heeter 1995; Lombard and Ditton 1997; Witmer and Singer 1998). Therefore, any factor that may hinder the flow of attention to the stimuli will reduce a sense of presence.

Stereoscopic 3-D advertising may have potentially problematic issues in creating a sense of presence. The most troublesome problems with stereoscopic 3-D advertising are related to two irritations: (1) wearing glasses and (2) cybersickness. These negative aspects of stereoscopic 3-D advertising commonly may prevent ad viewers from attending to media, resulting in weakened advertising effectiveness and negative responses, as any type of irritation may reduce advertising effectiveness (Aaker and Bruzzone 1985).

Ad viewers are required to wear 3-D glasses to separate visual information flowing into the left and right eyes, respectively. Even though the recently invented 3-D glasses look more fashionable and lighter than before, wearing glasses may be uncomfortable for ad viewers, especially those who also have to wear their own glasses to see clear images (Ault 2008; Lamb 2005; Shah 2009). As users become more experienced with wearing the 3-D glasses, the disadvantages associated with wearing them may lessen.

Cybersickness is another serious irritation that hinders ad viewers' attention to stereoscopic 3-D media. It refers to visually stimulated motion sickness found in virtual environments (So, Ho, and Lo 2001). All the negative symptoms found in cybersickness are very similar to the symptoms caused by motion sickness, such as eye strain, vomiting, headache, disorientation, and nausea (Kennedy et al. 1993; LaViola 2000; Witmer and Singer 1998). These symptoms may last for a significant amount of time, after media exposure (Johnson 2005).

Taken together, it is assumed that these factors (i.e., wearing glasses and cybersickness) will serve as irritations that reduce attention; they are distracters that make users avoid attending to the 3-D advertising.

H4a: Irritation will decrease ad viewers' attention to media (i.e., stereoscopic 3-D advertising).

At the same time, the negative feelings caused by these irritations may break the emotional equilibrium or hinder positive emotions, resulting in negative psychological responses, such as unpleasantness (Kennedy et al. 1993; LaViola 2000). Therefore, the irritation is expected to reduce media users' enjoyment while watching stereoscopic 3-D advertising.

H4b: The irritation will decrease ad viewers' perceived enjoyment.

However, virtual reality researchers also proposed that one of the most convenient and frequently used ways to reduce these negative virtual experiences is to have users increase their exposure time with virtual experiences in order to become familiar with the device and system (Kennedy et al. 1993; LaViola 2000). Therefore, it is assumed that

people who have had experiences with 3-D technology will be less influenced by negative irritations.

> H5: Previous media experience (with stereoscopic 3-D technology) will reduce irritation.

Many scholars have proposed that interactivity and vividness are critical components of a sense of presence (e.g., Sheridan 1992; Schubert, Friedmann, and Regenbrecht 2001; Steuer 1992; Witmer and Singer 1998). The following section describes them.

Interactivity

Since every human action potentially involves interactivity (Heeter 2000), the concepts and definitions of interactivity vary widely (Kiousis 2002). Prior scholars have largely viewed it from three different perspectives: 1) as interpersonal communication, 2) as user perception, and 3) as technological outcome. Specifically, the traditional perspective on interactivity views it as the outcome of a process of interpersonal communication that involves human-to-human interaction (e.g., Bretz 1983; Rafaeli 1988; Williams, Rice, and Rogers 1988). Other scholars have asserted that an interactivity is based on users' subjective perceptions of an interactive experience, focusing on individual traits that induce a sense of interactivity (e.g., Downes and McMillam 2000; Newhagen, Cordes, and Levy 1995). For example, Newhagen et al. (1995) insisted that a sense of interactivity cannot be experienced without an individual's motivation to participate in interactive media, so that in spite of highly advanced technology that has the potential to create a high level of interactivity, media users may

not sense or experience interactivity. In contrast, some scholars have understood interactivity as an outcome resulting from technological properties. For example, Schneiderman (1987) asserted that interactivity indicates the technological ability to make users become involved in the media content, heavily accentuating the importance of technological aspects. Steuer defined interactivity as "the extent to which users can participate in modifying the form and content of a mediated environment in real time" (1992, p. 84). Lombard and Snyder-Duch echoed their idea by proposing that interactivity is "a characteristic of a medium in which the user can influence the form and/or content of the mediated presentation or experience" (2001, p. 57). That is, scholars with this perspective have focused on how the characteristics of a medium influence consumer responses (e.g., Ha and James 1998; Heeter 1989; Steuer 1992).

From the technological perspective, Steuer (1992) suggested three major components that stimulate interactivity; they are speed, referring to how fast content in the mediated environment can be manipulated; mapping, referring to how similar the control used in the mediated environment is to the one in real world; and range, referring to how broadly content in the mediated environment can be manipulated. For example, a media user, who experiences a slow or late response in the settings of a video game, internet web browsing (e.g., slow download), or touch phone, will sense a low level of interactivity, since the medium does not provide a proper speed of feedback. In contrast, a video game that enables many actions and reactions between gamers and the mediated environment creates a high level of interactivity since the gamers can interact with many virtual objects.

Interactivity is identified as a core factor resulting in effective advertising in terms of its influence on favorableness, persuasiveness, and user engagement in prior studies (e.g., Bezjian-Avery, Calder, and Iacobucci 1998; Ko, Cho, and Roberts 2005; Pavlou and Stewart 2000; Rodgers and Thorson 2000; Wu 2005). In contrast to traditional advertising in which viewers are passively exposed to ads (e.g., television and radio), interactive advertising (e.g., the Internet) encourages ad viewers to participate in efficient message-information processes and improves the quality of consumer decision making (Bezjian-Avery, Calder, and Iacobucci 1998). Many researchers have confirmed that consumers' active participation in the interactive communication processes brings many benefits in terms of marketing efforts. For example, some psychologists have empirically confirmed that interactivity improves memory for brand names (Lutz and Lutz 1977). Jee and Lee (2002) identified that there is a positive correlation between interactivity and attitudes towards web sites and intention to purchase the advertised products. Furthermore, messages in a web site with a high level of interactivity are perceived to be more persuasive than those with a low level of interactivity (Sundar, Kalyanaraman, and Brown 2003).

Vividness

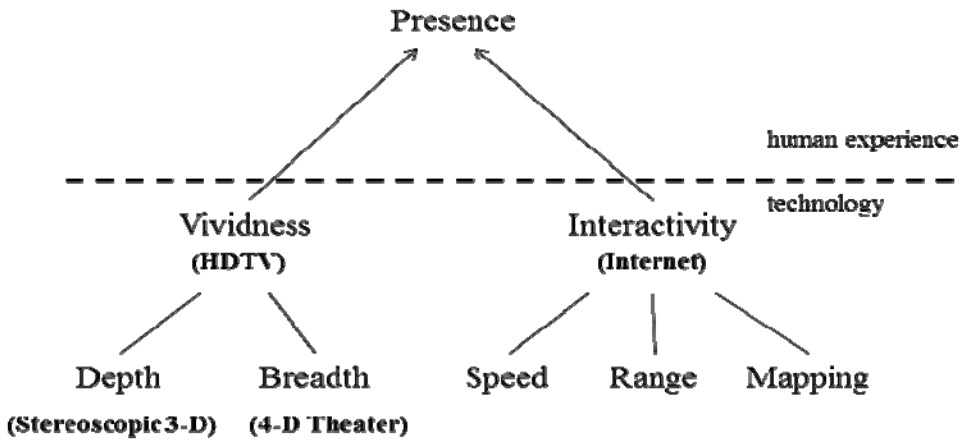
Vividness is also recognized as a critical factor that enhances a user's sense of presence (Heeter 1992; Steuer 1992; Zeltzer 1992). Vividness refers to "the ability of a technology to produce a sensorially rich mediated environment" (Steuer 1992, p. 80). Other scholars similarly echoed this concept, labeling it as realness, realism, or richness (Li, Daugherty, and Biocca 2002; Naimark 1990; Sadowski and Stanney 2002; Witmer

and Singer 1998). Although many factors affect a sense of vividness, the most commonly mentioned factors are sensory depth and breadth (Steuer 1992). Sensory depth indicates the quality of the represented information as perceived by media users (Li, Daugherty, and Biocca 2002; Steuer 1992). For example, a larger size of screen, a higher resolution of image, and high-definition sound can elicit a greater sense of presence (e.g., iMAX movies) (Bracken 2005; Lombard 1995; Lombard et al. 2000b). Sensory breadth is related to the number of sensory dimensions a communication medium can present (Li, Daugherty, Biocca 2002; Steur 1992). Thus, a medium equipped to deliver stimuli to multiple senses should produce a high level of vividness, resulting in a high sense of presence (e.g., 4D movie theaters providing wind, heat, and shaking).

Taking all the concepts of vividness and interactivity together, each medium has a somewhat different manner of generating a sense of presence. For example, the Internet tends to focus on the function of interactivity in that it provides users with a channel to express their responses and receive reactions (e.g., mouse clicking and keyboard input). In contrast, iMAX movies emphasize vividness in eliciting a sense of presence, since users watch the movies with dramatic images but have no opportunity to interact with the content (Steuer 1992). The current format of stereoscopic 3-D advertising (e.g., 3-D commercials, 3-D cinema advertising) is similar to traditional television in that the format lacks interactivity as compared with the Internet; however, this new medium tends to stimulate a sense of presence by providing users with stereoscopic images that are close to reality (Lombard and Ditton 1997; Muhlbach, Bocker, and Prussog 1995). Theoretically speaking, the uniqueness of stereoscopic 3-D advertising is in appealing to

the sensory depth of vividness, especially the visual sense. These media comparisons are displayed in Figure 2.

Figure 2: Technological Variables Influencing Presence (Steuer 1992)



Many researchers have empirically confirmed the relationship between image quality and presence (e.g., Bracken 2005; Neuman 1990; Reeves, Detenber, and Steuer 1993). For example, Bracken (2005) tested the impact of HDTV (high definition television) compared to standard definition television (SDTV). The advantage of HDTV (1080 lines) compared with SDTV (480 lines) is that it provides a superior image quality in terms of resolution, color accuracy, sharpness, and brightness (Bracken 2005; Lombard and Ditton 1997). Ninety-five participants evaluated their experience after watching a 13 minute-long video clip. The results indicated that participants who watched HDTV reported a higher level of immersive presence than those who watched SDTV.

Therefore, parallel to this finding, the stereoscopic 3-D display presents an image more vividly or realistically and as such will yield a greater sense of presence than

conventional 2-D advertising. As a result, stereoscopic 3-D advertising seems to be significantly better than conventional 2-D advertising as a communication tool in providing visual information about products. This is especially significant, considering that consumers look for information mainly through the visual sense (Witmer and Singer 1998).

Presence as a Marketing Communication Tool

Although more empirical research is required, presence appears to play a mediating role between aspects of the media experience and measures of the effectiveness of marketing communication (e.g., Li, Daugherty, and Biocca 2002; Lombard and Ditton 1997). More specifically, Nelson, Yaros, and Keum (2006) undertook an experiment in the context of in-game advertising, aiming to reveal the relationship between presence and gamers' evaluations of fictitious and real brands. Their results identified that presence is positively associated with gamers' attitudes about brands seen in a game (i.e., perceived persuasion). Similarly, Li, Daugherty, and Biocca's results (2002) illustrated that presence serves a role in generating product knowledge and brand attitudes. In addition, Klein (2003) revealed that a higher level of presence provided stronger beliefs about and attitudes towards an advertised product.

However, little research has investigated why these positive benefits are obtained from presence. Therefore, the following section examines the components of presence in terms of marketing communications, and suggests two dominant factors that could be critical to explaining the impact of presence; 1) enjoyment and 2) consumer learning.

Impact of Presence: Enjoyment

In this study, enjoyment is defined as the psychological feeling of pleasure during the advertising experience (Lin et al. 2002), and this term will not be distinguished from entertainment. This is because the psychological characteristics of entertainment are closely linked to enjoyment in that both involve emotional pleasure (Sherry 2004; Vorderer, Klimmt, and Ritterfeld 2004). Furthermore, it is often believed that people do not differentiate entertainment from enjoyment (Norris and Colman 1994; Sherry 2004).

In virtual reality research, enjoyment, which is at the core of media entertainment, is considered to be dominant impact of presence (Daugherty, Li, and Biocca 2005; Lombard and Ditton 1997; Weiss et al. 2004; Vorderer, Klimmt, and Ritterfeld 2004; Witmer and Singer 1998). For example, Nichols and her colleagues' research (2000) indicated that a sense of presence enhances enjoyment in the setting of a computer game. Similarly, participants in Heeter's study (1995) reported that the experience of entering another world (i.e., presence) through virtual reality created a greater sense of enjoyment.

Unfortunately, only a limited number of studies have proposed a reason why presence results in enjoyment, probably because the impact of presence on enjoyment is taken for granted (Lombard and Ditton 1997; Vorder, Klimmt, and Ritterfeld 2004). A couple of explanations are available. First, as shown in Heeter's study (1995), people tend to feel enjoyment when they experience a new world. Uses and Gratifications theory (Katz, Blumler, and Gurevitch 1974) proposed that media users are active beings, rather than passive, and they choose media in order to achieve their specific gratifications or needs, such as cognitive (e.g., information) and affective needs (e.g., pleasure), personal

(e.g., status) and social integrative needs (e.g., friends), and tension release needs (e.g., escape) (Severin and Tankard 2000). Presence enables media users to enter the new immersive virtual world, forgetting the present world and the time elapsed (i.e., escape) (Witmer and Singer 1998). Consistent with a Uses and Gratifications approach and the usual purpose of travel, the virtual experience provides people with arousal, relaxation, and an escape from everyday life, satisfying the motivations for media use and leading to great enjoyment, (Katz, Blumler, and Gurevitch 1974; Mokhtarian et al. 2001).

The concept of flow helps explain the enjoyment involved in immersive media uses (Csikszentmihalyi 1988; Nakamura and Csikszentmihalyi 2002). Csikszentmihalyi (1993) viewed enjoyment as self-motivating experience in the flow state in which people are focused on current activities, losing self-consciousness and track of time and worries. As such, it is very similar to the concept of presence. As with presence, if tasks are too easy for media users, they may experience boredom, and if the difficulty of the task is beyond their ability, they may feel a certain amount of anxiety. Therefore, the experience of flow arises when video game players experience a balance between their skill (ability) and the task difficulty (challenge) (Chen 2007; Sherry 2004).

In a similar vein, flow theory (Csikszentmihalyi 1990, 1993) supports the relationship between attention, involvement, and the function of media, which is useful in explaining the effects of stereoscopic 3-D advertising. The state of flow represents the immersive experience within virtual environments, and it results in a sense of presence. This experience provides enjoyment, as flow theory describes. However, in a medium like stereoscopic 3-D, irritation (e.g., wearing glasses, cybersickness) may cause media

users (3-D ad viewers) to experience a negative psychological state (e.g., anxiety). If stereoscopic 3-D advertising is not able to provide a sense of flow, then individuals may not experience presence and may experience boredom.

Vorderer and his colleagues (2004) proposed a model of complex entertainment experience. The conceptual model suggests that prerequisites such as user traits, motives, and media traits are related to enjoyment in diverse media experiences. Specifically, to experience enjoyment, media users must have motivations to be entertained (e.g., escapism, mood management) and a willingness and ability to be immersed within that environment or to interact with an individual in that environment (e.g., presence, empathy). Furthermore, the media that users adopt should contain certain levels of aesthetic advances and enjoyable content (Vorderer, Klimmt, and Ritterfeld 2004). When these conditions are satisfied, users come to experience enjoyment, resulting in excitation, catharsis, and learning. Excitation-theory (Zillmann 1996) explains that the psychological arousal created after media exposure does not quickly dissipate, but remains until the end of the media experience, and the arousal created during that exposure spills over into the final evaluation of the content. Therefore, the model explains that media generating a higher sense of presence tend to produce greater enjoyment.

> H6: Ad viewers with a high level of presence will experience greater enjoyment than those with a low level of presence.

In marketing communications, enjoyment is often associated with positive evaluations (e.g., Batra and Ray 1986; Edell and Burke 1987; Olney, Holbrook, and Batra 1991). Many previous studies have identified the positive relationship between

enjoyment or entertainment and attitudes towards advertising. For example, Schlosser and Shavitt (1999) found that enjoyment or entertainment in advertising affects attitudes towards Internet advertising, consistent with the findings of Ducoffe (1996). Later, the relationships among the variables were, again, confirmed in the setting of mobile advertising (Tsang, Ho, and Liang 2004).

> H7: Ad viewers who perceive high enjoyment will have more favorable attitudes toward advertising than those who perceive low enjoyment.

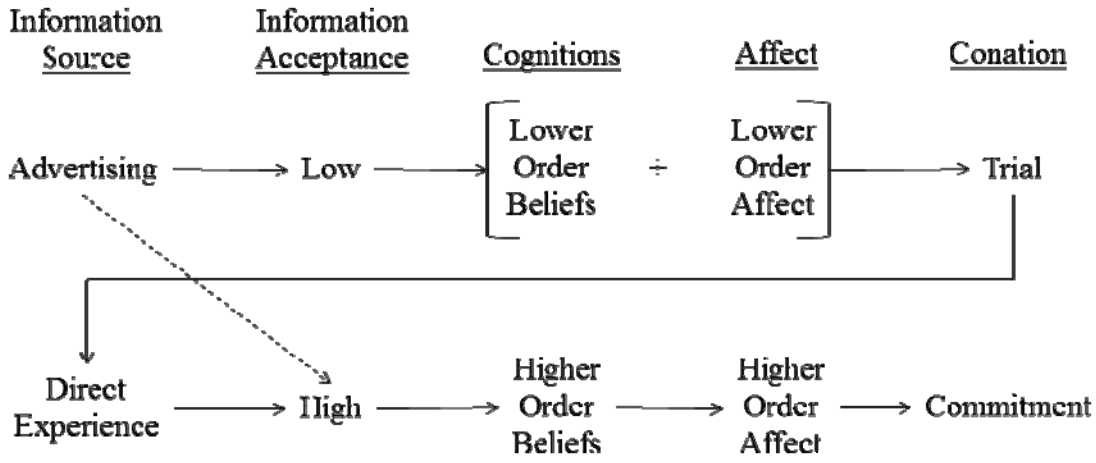
Impact of Presence: Consumer Learning

Another benefit of presence is that it allows media users to have a vivid and direct experience (Li, Daugherty, and Biocca 2002; Daugherty, Li, and Biocca 2005; Lombard and Ditton 1997). This benefit is often used to provide media users with information and training. More specifically, virtual reality systems have been used to teach and train pilots, military soldiers, and surgeons on detailed procedures and operations. Similarly, consumers can learn about products through virtual experiences that induce presence (Li, Daugherty, and Biocca 2002, 2003). For example, Daugherty and his colleagues (2008) conducted a study to compare how indirect, direct, and virtual experiences affect product knowledge building. Their results proposed that learning through virtual experience more significantly enhances consumer product knowledge than learning through direct or indirect product experiences.

Smith and Swinyard (1982) presented an Integrated Information Response Model that helps explain how stereoscopic 3-D advertising can enhance consumer product knowledge and improve the likelihood of a subsequent product purchase. The Integrated

Information Response Model explains that the exposure to advertising normally creates lower order beliefs and affect, leading to a desire for trial behavior (e.g., test drives, product demonstrations). However, when consumers with lower order beliefs intend to reduce risk and uncertainty (due to high involvement), they may want to obtain direct experience with a product. As a result, their beliefs may gravitate toward higher order beliefs since direct experience through their own senses builds a strong belief (Fishbein and Ajzen 1975). Finally, the improved order belief and affect are linked to commitment (see Figure 3).

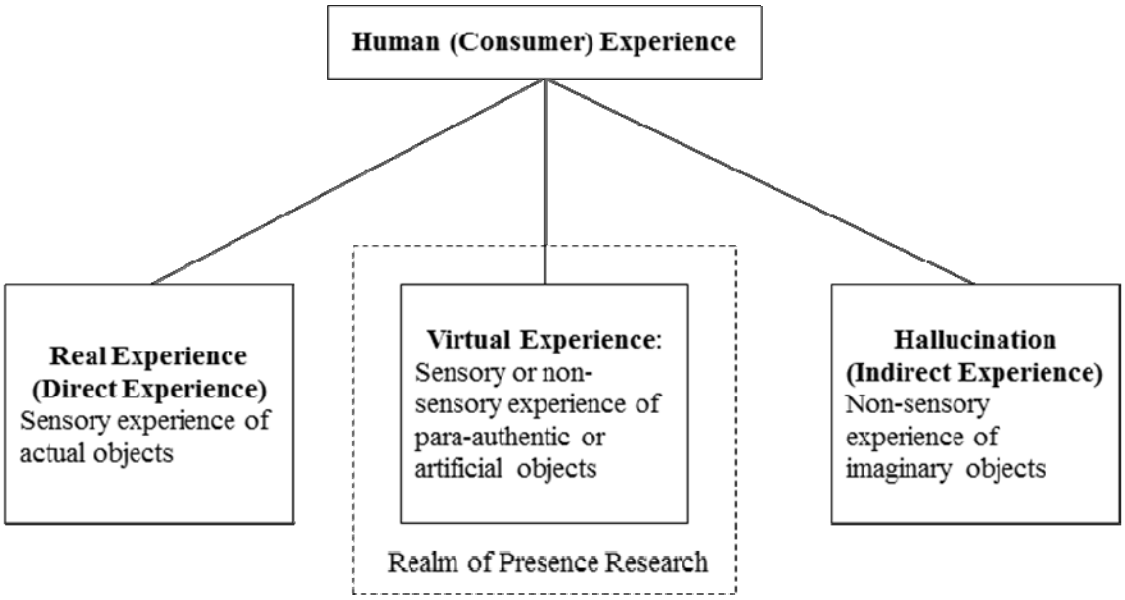
Figure 3: Integrated Information Response Model (Smith and Swinyard 1982)



One notable aspect of this model is that the belief strength (high or low order belief) is determined by the level of user experience; direct experience creates stronger cognition, affection, and conation (the probability of future purchase) than indirect experience (Smith and Swinyard 1982). Similarly, many studies have identified that stronger attitude-behavior consistency is constructed through consumers' direct product

experiences (e.g., product trial or sampling) rather than indirect product experiences (e.g., product advertising) (e.g., Fazio, Zanna, and Cooper 1978; Marks and Kamins 1988; Smith and Swinyard 1988).

Figure 4: Typology of Human Experience for the Study of Presence (Lee 2004)



In short, media that help consumers experience direct product experiences may increase product knowledge. For example, as theoretical evidence related to virtual product representations indicate, stereoscopic 3-D visualization based on virtual experience is close to a channel to provide direct product experience (Lombard and Ditton 1997). This is because the medium allows consumers to observe multiple-dimensions of a product with a true depth (popup images off screen), resulting in a richer product experience than traditional 2-D advertising (Dodgson 2005; Jin et al. 2007; Qian 1997). The media richness (i.e., vividness, realness) enhances a sense of presence, and presence, in turn, leads media users to perceive experiences with objects in a state

between real experience, which is "the sensory experience of actual objects," and hallucination, which is "nonsensory experience of imaginary objects" (Lee 2004, p. 38) (see Figure 4).

As such, the discussion regarding the Integrated Information Response Model (Smith and Swinyard 1982) and prior literature suggest that a medium prompting a higher sense of presence (e.g., stereoscopic 3-D) will induce more consumer learning than a medium prompting a lower sense of presence (e.g., conventional 2-D).

> H8: Ad viewers with a high level of presence will obtain greater product knowledge than those with a low level of presence.

To choose among all the possible alternatives, consumers require information, and advertising serves a primary role in providing information (Ducoffe 1996; Nelson 1970). Exhibiting product images is one of the frequently used methods in informative advertising, and advertising can also provide more detailed explanations about products that cannot be displayed (e.g., product functions, price, warranty period) (Andrews 1989; Bauer and Greyser 1968). Therefore, product information in advertising is considered an important criterion determining the quality of advertising. The amount of information advertising contains affects attitudes towards advertising (Hovland and Wilcox 1989; Nelson 1974).

> H9: Ad viewers who perceive high product knowledge from advertising will have more favorable attitudes toward advertising than those who perceive low product knowledge.

In summary, the model in Figure 5 is constructed based on hypotheses 1 through 9. It addresses how the media experience is created within a new medium and how it is

associated with advertising effectiveness. Specifically, the model proposes a sequential relationship among media novelty, attention, and presence, and it acknowledges that irritation related to a new medium may hinder this process. A new medium is assumed to hold a strong media novelty effect, resulting in attention to the medium, and in turn, attention leads users to plunge into an immersive media experience (a high sense of presence). The increased sense of presence permits ad viewers to obtain enhanced knowledge about the advertised products and experience greater enjoyment. In addition, it creates positive attitudes toward the advertising. Moreover, the model explains how personal traits – previous media experience, curiosity, and innovativeness – are related to the process of the media experience. Specifically, previous media experience may not only reduce the impact of media novelty, but also alleviate the negative impact of irritation. Ad viewers with greater curiosity or innovativeness are assumed to pay more attention to media, when the level of media novelty is perceived enough to stimulate their exploration behavior.

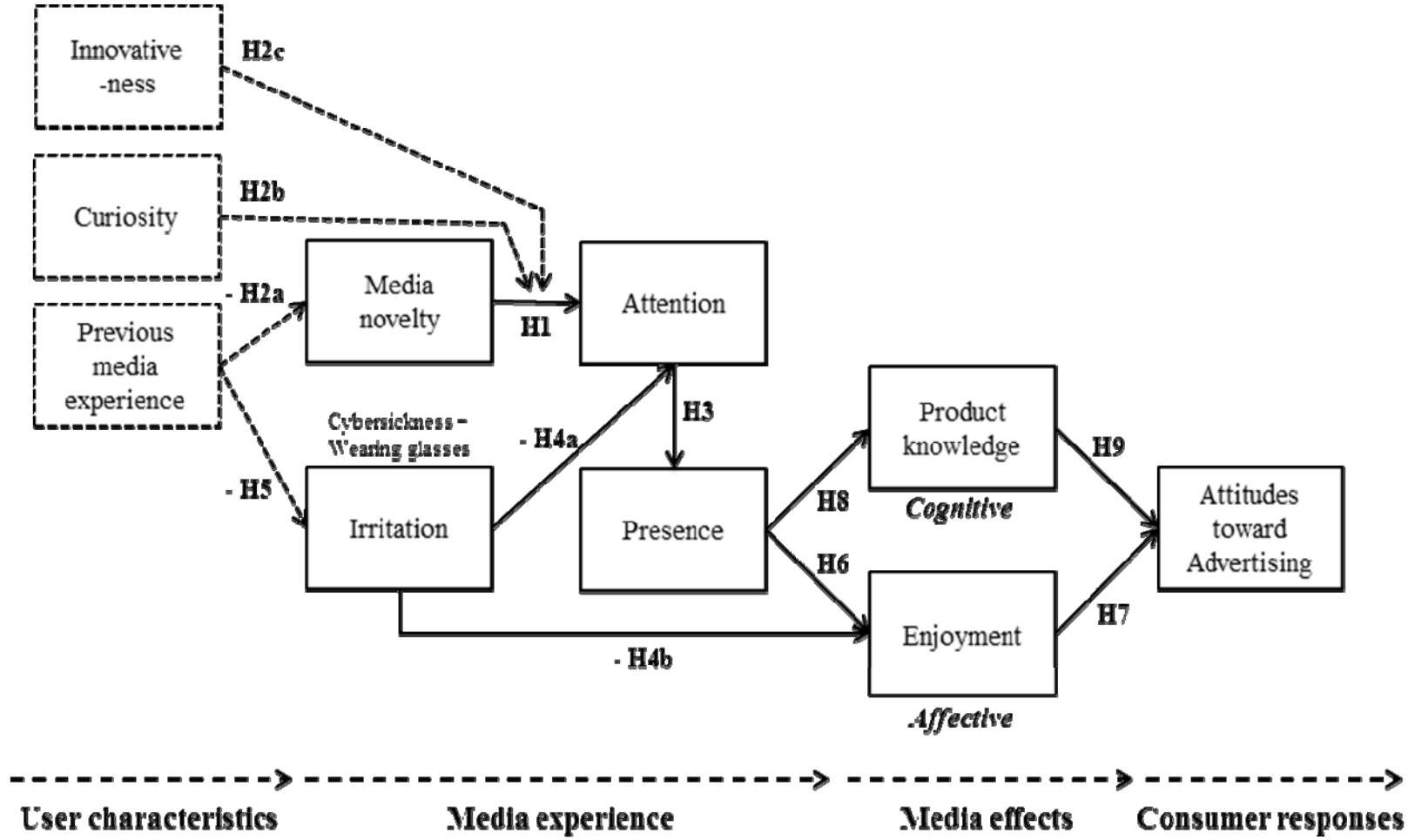
SUMMARY OF HYPOTHESES AND CONCEPTUAL MAP

Finally, this section provides the summary of the suggested hypotheses (see Table 1), and the conceptual model constructed based on the hypotheses 1 through 9 is proposed as below (see Figure 5).

Table 1: Summary of Hypotheses

	Diagram	Detail
H1	media novelty → attention	Ad viewers who perceive a higher level of media novelty will pay greater attention to media (i.e., stereoscopic 3-D advertising).
H2a (-)	previous media experience → media novelty	Ad viewers who have previously experienced media (i.e., stereoscopic 3-D advertising) will perceive decreased media novelty.
H2b	curiosity: moderator between media novelty & attention	When ad viewers perceive greater media novelty, those with greater curiosity will pay more attention to media (i.e., stereoscopic 3-D advertising).
H2c	innovativeness: moderator between media novelty & attention	When ad viewers perceive greater media novelty, those with greater innovativeness will pay more attention to media (i.e., stereoscopic 3-D advertising).
H3	attention → presence	Ad viewers who pay a higher level of attention to media (i.e., stereoscopic 3-D advertising) will perceive a greater sense of presence.
H4a (-)	irritation → attention	Irritation will decrease ad viewers' attention to media (i.e., stereoscopic 3-D advertising).
H4b (-)	Irritation → enjoyment	The irritation will decrease ad viewers' perceived enjoyment.
H5 (-)	previous media experience → irritation	Previous media experience (with stereoscopic 3-D technology) will reduce irritation.
H6	presence → enjoyment	Ad viewers with a high level of presence will experience greater enjoyment than those with a low level of presence.
H7	enjoyment → attitudes towards advertising	Ad viewers who perceive high enjoyment will have more favorable attitudes toward advertising than those who perceive low enjoyment.
H8	presence → product knowledge	Ad viewers with a high level of presence will obtain greater product knowledge than those with a low level of presence.
H9	product knowledge → attitudes towards advertising	Ad viewers who perceive high product knowledge from advertising will have more favorable attitudes toward advertising than those who perceive low product knowledge.

Figure 5: Model of Consumer Media Experience



CHAPTER 3: Methodology

To test the proposed model including hypotheses, an experiment was designed to investigate participants' responses to stereoscopic 3-D and 2-D advertising. The overall investigation consisted of a pilot study and a main study including a pre-test and a post-test experiment. The pilot study was designed primarily test the appropriateness of the scales that were used in the main study. In the pretest of the main study, participants' personality traits and demographic information were gathered; the post-test garnered individuals' responses to stereoscopic 3-D or 2-D advertising. The entire procedure, including measures, data collection, and analysis processes, is discussed in this chapter.

GENERAL METHODOLOGY

The study design consisted of a pretest (before stimuli exposure) and a posttest (after stimuli exposure). The pretest was conducted when participants first arrived at the lab. All of the pretest questions were related to participants' personal characteristics, such as curiosity, innovativeness, previous media experience, product involvement, and demographic information. In the posttest, participants were asked about their media experience (e.g., media novelty, attention to stimuli, presence, and irritation) and their evaluations of the stimuli (e.g., enjoyment, product knowledge, attitudes toward ad). All the participants who evaluated the stereoscopic 3-D stimulus were required to wear 3-D glasses, while those in the 2-D condition were not.

When participants at the lab, the primary researcher warned them about the possible side effects of stereoscopic 3-D display (e.g., dizziness) in case that they were

assigned to the 3-D condition. Participants then watched the ads in groups of one to seven (average group size: pilot study = 3.94, *SD* = 1.91, main study = 1.37, *SD* = .77). Groups of participants were randomly assigned to either the 3-D or 2-D experimental condition, and they watched either a one-minute (i.e., fast food) or a 30-second advertisement (i.e., cellular phone) twice. All sessions were led by one primary researcher.

Devices

A glasses-type 32-inch Miracube stereoscopic 3-D monitor sponsored by Pavonine Korea was used in the study. The monitor device was switchable between 3-D and 2-D modes, so the same device could be used in both conditions, avoiding any bias possibly caused by monitor size and design (see Figure 6).

Figure 6: Miracube 32" Stereoscopic 3-D Monitor

Measures

The following section introduces all the measures used in the pilot study and the main study. All items were measured with seven-point scales, except for some demographic questions. The reliabilities reported in this section are from the previous

studies; the actual reliabilities tested in both studies are reported in Chapter 4 and Appendix A.

Measures – Pretest

In the pretest, questions were focused on participants' personal traits and individual differences, such as curiosity, innovativeness, previous media experiences, and product involvement. The pretest measures were not associated with the influence of stimulus exposure.

Curiosity. Participants were asked to rate curiosity, an individual trait consisting of two components: exploration (intention to seek for novelty and challenge) and absorption (engagement in activities) (Kashdan, Rose, and Fincham 2004) (α = .72, .80). The measure of curiosity had seven items with a seven-point Likert scale –four items for exploration, and three items for absorption. For example, the scale representing exploration included items such as, "I would describe myself as someone who actively seeks as much information as I can in a new situation," and "I frequently find myself looking for new opportunities to grow as a person (e.g., information, people, resources)." The absorption included the item, "When I am participating in an activity, I tend to get so involved that I lose track of time."

Innovativeness. Another individual characteristic, innovativeness, was assessed with a self-report measure, Goldsmith and Hofacker's scale (1991) (α = .81). The scale consisted of six questions with a seven-point Likert scale. This scale, among many others, was adopted since it deals with an individual's innovativeness in a specific product domain (Goldsmith and Hofacker 1991). The original items, which dealt with the product

category of rock albums, were revised to reflect the context of the current study. In this study, the innovativeness of all participants was measured in terms of how they responded to high-tech products – cellular phone, laptop, and MP3 players. Innovativeness was measured in terms of high tech products because stereoscopic 3-D display belongs to this product category. Sample items in the scale included, "In general, I am among the first (last) in my circle of friends to buy new high-tech products (e.g., cellular phone, notebook, MP3 player), when it appears" and "Compared to my friends, I often purchase a new technology product."

Product Involvement. Among many possible product involvement scales, Zaichkowsky's (1985) (α = .93) short scale was adopted since it had been used in many studies in the domain of new media (e.g., Cho 1999; Coyle and Thorson 2001; Jee and Lee 2002). This instrument had seven items on a seven-point semantic differential scale (e.g., doesn't matter – matters, unimportant – important, and useless – useful).

Previous Media Experience. Previous media experience was operationally defined as an individual's familiarity with a given media, and thus, the scale for familiarity (Kent and Allen 1994; α more than .85) was revised to ask participants about their previous media experience. Thus, an individual with a high level of previous media experience with stereoscopic 3-D technology was assumed to have a high level of media familiarity. The scale asked participants three items with seven-point semantic differential scales (e.g., unfamiliar – familiar, inexperienced – experienced, not knowledgeable – knowledgeable).

Demographic Information. The pre-survey ended with several basic questions regarding participants' demographic information, such as age, gender, race, and income.

Measures – Posttest

All the measures in the posttest were focused on participants' responses after their exposure to stereoscopic 3-D or 2-D advertising.

Media Novelty. Previous studies dealing with media novelty have often borrowed the concept of advertising familiarity suggested by Schlinger (1979). Since advertising familiarity (ad novelty) and media familiarity (media novelty) are conceptually different, a revised scale was employed for this measure. Schlinger's three items with seven-point Likert-type scales were adapted to include the following items: "I've seen commercials in this type of media many times… it's the same old thing," "I've seen this type of media so many times – I'm tired of it," and "I think that it is unusual to see a commercial in this media. I'm not sure I've seen another one like it."

Additionally, another scale to measure media novelty was used in this study. Participants were asked to rate the media novelty on four dimensions – new, unique, different, and unusual (e.g., stereoscopic 3-D technology is perceived as ___). The measure had seven-point Likert scales anchored by "strongly disagree" and "strongly agree." The validity and reliability of the two media novelty measures were compared to identify the better scale.

Presence. Witmer and Singer's scale (1998) (α = more than .80) to measure a sense of presence was adopted. Originally, their scale consisted of 32 item measuring both interactivity and vividness. For this study, items unrelated to stereoscopic 3-D

advertising, such as a sense of touching (haptic) and distraction factors, were eliminated; a shortened version of the scale consisting of 24 items was used. Sample items included, "How completely were all of your senses engaged?" "How much did the visual aspects of the environment involve you?" and "How much did the auditory aspects of the environment involve you?"

Attention to Media. Participants' attention to media/stimuli was measured by adopting Novak, Donna, and Yung's scale (2000) (α = more than .70) of four items with a seven-point semantic differential scale. The items simply described how much attention participants paid to the stimulus (e.g., not deeply engrossed – deeply engrossed; absorbed intently – not absorbed intently).

Irritation. The most serious irritations expected in the experience of viewing 3-D advertising were cybersickness and discomfort caused by wearing glasses. Thus, these two components were measured and combined in one instrument. The questions related to cybersickness were suggested by Lombard and Ditton (2001) (α = .74, .75) and consisted of five items with seven-point Likert scales (e.g., To what degree did you experience dizziness with your eyes open while watching the advertising? To what degree did you experience nausea while watching the advertising?) A modified version of the favorability scale suggested by Andrews et al. (1992) (α = .89) identified participants' discomfort level with wearing glasses; it had four questions with seven-point semantic differential scales (e.g., unfavorable – favorable, bad – good, negative – positive).

Enjoyment. Schlingers' (1979) scale was adopted to measure participants' perceived enjoyment after media exposure (α = more than .87). The instrument was used

to measure how much enjoyment participants reported after watching commercials. The full scale consisted of seven items with seven-point Likert scales (e.g., The commercial was lots of fun to watch and listen to; I thought it was clever and quite entertaining).

Product Knowledge. A four-item, seven-point Likert scale created by Smith and Park (1992) (α = .80) was used to assess product knowledge. The scale asked participants how knowledgeable they felt about the advertised product after watching the stimuli. The items were revised to reflect the advertised product – cellular phone, soft drink, or fast food (e.g., I feel very knowledgeable about this product shown in the advertising; If a friend asks me about this product; I can give him/her advice about this product shown in the advertising).

Consumer Responses. The final consumer responses after stimuli exposure were tested by measuring participants' attitudes toward the stimuli/ads, brand attitudes (Andrews et al. 1992), and purchase intentions (Beerli and Santana 1999). The scales contained three items for attitudes toward the ad and attitudes toward the brand (e.g., unfavorable – favorable, bad – good, and negative – positive), and four items for purchase intention (unlikely – likely, improbable – probable, impossible – possible, and uncertain – certain). All items used seven-point, semantic differential scales.

CHAPTER 4: Analysis and Results

In this chapter, the pilot study, its analysis procedures and results, will be described. Afterward, the main study will be described, and its results, the model and hypotheses tests, will be reported.

PILOT STUDY

The objectives of the pilot test were mainly twofold: 1) refining the scales to be used in the main study and 2) testing the quality of the stimuli. In testing the stimuli, three criteria were applied. First, a stimulus should prompt a moderate level of enjoyment (affective appeal) and product knowledge (cognitive appeal) to avoid floor effects or ceiling effects, which can prevent independent variables from having an effect on dependent variables (Cramer and Howitt 2005). Second, the product category should be relevant to the participants, who are college students. Third, the quality of stereoscopic 3-D ads should be appropriate for the main study. Quality was evaluated based on the degree of presence and cybersickness that stimuli prompted. That is, high quality stereoscopic 3-D advertising evokes a high level of presence and a low level of cybersickness. However, we aimed to have stimuli of diverse quality, which would prompt varying levels of presence and cybersickness, to have more normally distributed samples.

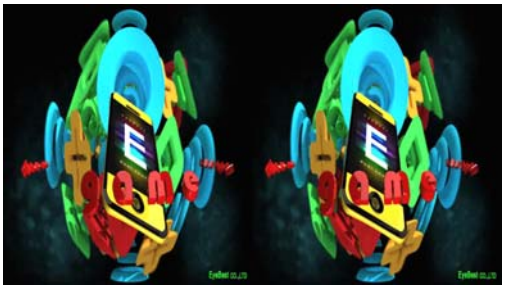
Stimuli

For the pilot study, stereoscopic 3-D ads for fast food (KFC: Kentucky Fried Chicken) and a cellular phone (fictitious brand: EyeBest) were prepared (see Figure 7).

The ads had different advantages and/or disadvantages as stimuli for the study. For an existing brand such as KFC (one minute exposure), participants had preexisting attitudes. As such the ad for KFC provided an opportunity to track participants' immediate changes in attitude toward the brand and purchase intention in response to the repeated measures (i.e., pre- vs. post-exposure). In contrast, the use of a fictitious brand name, EyeBest Dual Touch (30 seconds), for the cellular phone had the advantage of not evoking biases caused by preexisting attitudes.

Figure 7: Stimuli – Stereoscopic 3-D Ads for Fast Food and Cellular Phone

Stereoscopic 3-D Ad for Fast Food



Stereoscopic 3-D Ad for Cell Phone

Participants

A total of 109 college students from a Southeastern university participated in the pilot study (see Table 2). The average age of participants was 21.01 (*SD* = 1.57) years, and the sample consisted of 64.2 percent female and 35.8 percent male students. The majority of participants were White (67.9%), followed by Hispanic (11.9%), Asian/Pacific Islander (9.2%), and African American (8.3%).

Procedures

When participants came to the laboratory, they were informed of a potential risk regarding cybersickness (e.g., dizziness, motion sickness, and eye strain). After agreeing to participate, they were randomly assigned to one of the two research conditions, either stereoscopic 3-D or 2-D advertising.

Table 2: Demographic Information for Pilot Study Participants

	n = 109
Gender	Female (64.2%)
	Male (35.8%)
Age	21.01 (*SD* = 1.57)
Race	White (67.9%)
	Hispanic (11.9%)
	Asian / Pacific Islander (9.2%)
	African American (8.3%)
	Other (2.8%)
Income	Less than $29,999 (47.2%)
	$30k - $59,999 (6.5%)
	$60k - $89,999 (10.2%)
	$90k - $129,999 (18.5%)
	More than $129,999 (17.6%)

Results

All the statistical analyses have been conducted using SPSS 18.0 (Statistical Package for the Social Sciences) and AMOS 18.0. In testing reliability and validity, Cronbach's α and factor analysis were used. After refining the measures through a factor analysis process, all the scales exceeded the recommended level of reliability, .70 (Hair et al. 1998) (see Table 3). As for media novelty, two different measures were tested. The revised scale suggested by Massetti (α = .97, factor loadings = .90 – .97) performed better

than Schlinger's scale (α = .77, factor loadings = .75 – .91) in terms of both reliability and validity, so the Massetti's scale was adopted in the main study.

Table 3: Reliability and Validity in Measures

Measure	Reliability	Standardized Factor Loadings
Curiosity (Kashdan, Rose, and Fincham 2004)	.75	.72 - .87
Innovativeness (Goldsmith and Hofacker 1991)	.91	.55 - .91
Previous media experience (Kent and Allen 1994)	.95	.95 - .96
Product involvement (Zaichkowsky 1985)	.96	.82 - .93
Media novelty		
Schlinger 1979	.77	.75 - .91
Massetti 1996	.97	.90 - .97
Irritation		
Wearing glasses (Andrews et al. 1992)	.94	.86 - .95
Cybersickness (Lombard and Ditton 2001)	.75	.53 - .85
Presence (Witmer and Singer 1998)	.92	.50 - .83
Attention (Novak, Donna, and Yung 2000)	.77	.76 - .88
Enjoyment (Schlingers 1979)	.94	.63 - .95
Product knowledge (Smith and Park 1992)	.86	.61 - .81
Attitude toward advertising (Andrews et al. 1992)	.96	.95 - .96
Brand attitude (Andrews et al. 1992)	.96	.95 - .97
Purchase intention (Beerli and Santana 1999)	.91	.78 - .94

To assess the quality of stimuli, presence (positive impact) and cybersickness (negative impact) were compared in the 3-D and 2-D conditions (see Table 4). The results illustrated that the advertisement for the cellular phone was of better quality than the advertisement for fast food (e.g., higher on presence and lower on cybersickness). By combining the responses from the two ads, we determined that the proposed model could be tested based on more diverse levels of presence and cybersickness. That is, testing the model based on more diverse stimuli seemed more likely to produce generalizable results.

Table 4: Testing Stimuli of Stereoscopic 3-D and 2-D Advertising

	3-D	**2-D**	***t*-value**
Cellular Phone – EyeBest			
Presence	5.55 (.79)	4.45 (.90)	$t\,(105) = 6.74^{***}$
Cybersickness	1.64 (1.04)	1.38 (.70)	$t\,(98.19) = 1.52$
Enjoyment	5.41 (1.05)	4.62 (1.18)	$t\,(107) = 3.65^{***}$
Product knowledge	3.58 (1.38)	3.22 (1.36)	$t\,(107) = 1.36$
Fast Food – KFC			
Presence	4.36 (1.03)	3.68 (1.01)	$t\,(106) = 3.44^{**}$
Cybersickness	2.67 (1.70)	1.70 (.78)	$t\,(88.13) = 4.47^{***}$
Enjoyment	3.79 (1.57)	3.02 (1.61)	$t\,(107) = 2.52^{*}$
Product knowledge	3.92 (1.52)	3.68 (1.48)	$t\,(107) = .83$
Presence			
Skewness	-.45	-.06	
Kurtosis	.21	-.49	
Cybersickness			
Skewness	1.25	1.44	
Kurtosis	1.26	1.40	

Notes: Parenthesis indicates standard deviation.
* Significant at $p < .05$, ** Significant at $p < .01$, *** Significant at $p < .001$.

MAIN EXPERIMENT

The procedures and the devices used in the main study were identical to those of the pilot study. In the main study, one more stimulus was used to provide more diverse levels of presence and cybersickness. Specifically, an ad for a soft drink, a product category that is relevant to college students, was added into the stimuli. More detailed descriptions of the participants and stimuli are provided below.

Participants

A total of 476 college students were recruited from the Student Participant Pool of the Department of Advertising and Public Relations at the University of Texas at Austin (UT). Only students who were enrolled at UT and agreed to participate had an opportunity to be involved in this experiment. The average age of participants was 20.54 years old (SD = 2.74), and the sample consisted of 64.8 percent females and 35.2 percent males (see Table 5). The majority of participants were White (53.1%), followed by Asian/Pacific Islander (20.6%), Hispanic (17.1%), and African American (6.1%). The most frequent response to a question about parents' annual salary was more than $129,999 (28.8%), followed by $90,000 - $129,999 (26.2%).

Table 5: Demographic Information for Main Study Participants

	n = 476
Gender	Female (64.8%)
	Male (35.2%)
Age	20.54 (*SD* = 2.74)
Race	White (53.1%)
	Asian / Pacific Islander (20.6%)
	Hispanic (17.1%)
	African American (6.1%)
	Other (3.2%)

Income	Less than $29,999 (7.4%) $30k - $59,999 (16.9%) $60k - $89,999 (20.3%) $90k - $129,999 (26.2%) More than $129,999 (28.8%)

Figure 8: Stimuli by Product Category

Cell Phone Soft Drink Fast Food

Stimuli

The final set of stimuli included ads for a cellular phone, fast food, and a soft drink (see Figure 8). All the product categories were believed to be relevant to college students. Each commercial contained descriptions of products and visually entertaining factors to stimulate ad viewers' product knowledge and enjoyment. For example, the ad for the cellular phone with a fictitious brand name of "EyeBest" included detailed descriptions of product functions, such as music, games, Internet, email, and camera. The ad for a soft drink with a fictitious brand name of "AIVEs" introduced drinks with diverse fruit tastes and used bright music. The ad for fast food described diverse products, which rotated in the middle of screen while enjoyable music played. Each participant was randomly assigned to evaluate one of three commercials in the stereoscopic 3-D or 2-D format. By having responses based on diverse product categories, we aimed to obtain

more generalizable relationships among the measured variables in the proposed model. Simultaneously, by doing so, we could obtain more normally distributed samples, avoiding ceiling or floor effects.

Manipulation Check

Participants showed no difference among the three products in terms of product involvement (F (2, 473) = .50, $p > .6$, M_{cell} = 3.70, SD = 1.49, M_{drink} = 3.74, SD = 1.55, M_{fast_food} = 3.87, SD = 1.59), and they perceived all of the products as being moderately important (M = 3.77 out of 7, SD = 1.54). Therefore, differences caused by product category were not expected in the overall results. That is, the impact of a peripheral cue, such as entertainment factors, or of a central cue, such as argument quality, was not expected (Petty and Cacioppo 1981; Petty, Cacioppo, and Schumann 1983). At the same time, it was also reasonable to combine all the samples from the three different commercials to test the proposed model.

In addition, since participants' preexisting attitudes toward KFC could influence outcomes variables in the model, it was necessary to compare preexisting attitudes and purchase intentions toward KFC of participants in the 3-D and 2-D conditions. There were no significant differences (brand attitudes: t (138) = 1.63, *n.s.*, purchase intention: t (139) = 1.53, *n.s.*).

RESULTS

The focus of analyses was twofold: 1) identifying the impact of stereoscopic 3-D advertising in comparison with 2-D advertising and 2) testing a structural equation model

(SEM) and the proposed hypotheses based on 3-D, 2-D, and the combined samples (i.e., 3-D + 2-D). All the statistical analyses were performed using SPSS 18.0 and AMOS 18.0.

Comparisons of Stereoscopic 3-D and 2-D Advertising

Differences between stereoscopic 3-D and 2-D advertising were identified in all the measures using independent *t*-tests. Additionally, MANOVA (multivariate analysis of variance) was used in an effort to increase the chances for finding a group difference (Grimm and Yarnold 1995). The results are reported in Tables 6 and 7. MANOVA identified significant main effects of dimension on dependent variables in all three ads (cell: F (9, 153) = 10.89, η_p^2 = .39; drink: F (9, 157) = 7.87, η_p^2 = .31; fast food: F (9, 131) = 5.47, η_p^2 = .27; all $p < .001$), and both analyses indicated that stereoscopic 3-D advertising was superior to 2-D advertising in general (see Table 6 and 7). Specifically, stereoscopic 3-D advertising was better at eliciting a sense of presence, attention, and enjoyment, and many participants perceived stereoscopic 3-D as a significantly more novel medium than the 2-D display. Furthermore, in terms of marketing efforts, stereoscopic 3-D advertising produced more favorable attitudes toward the ad and brand and higher purchase intention for the cellular phone and soft drink. However, these positive outcomes were not found in fast food condition. This may be because the fast food condition had the highest level of cybersickness (M = 2.04, SD = 1.04), or because participants were so sensitive to health issues that the ad for fast food could not have a positive influence on their attitudes.

Table 6: Comparisons of Stereoscopic 3-D and 2-D Advertising in *t*-Test

	3-D	**2-D**	***t*-value**
Cellular Phone – EyeBest	(*n* = 97)	(*n* = 70)	
Presence	5.01 (.77)	4.03 (.98)	$t\,(163) = 7.13^{***}$
Novelty	5.49 (1.18)	4.18 (1.00)	$t\,(165) = 7.58^{***}$
Attention	5.44 (1.20)	4.46 (1.26)	$t\,(165) = 5.12^{***}$
Cybersickness	1.94 (.99)	1.74 (.90)	$t\,(165) = 1.32$
Enjoyment	4.78 (1.19)	3.73 (1.27)	$t\,(164) = 5.45^{***}$
Product knowledge	3.10 (1.31)	2.66 (1.16)	$t\,(165) = 2.24^{*}$
Advertising attitudes	5.34 (1.08)	5.05 (1.35)	$t\,(165) = 1.51$
Brand attitudes	4.75 (1.15)	4.00 (1.20)	$t\,(165) = 4.09^{***}$
Purchase intention	3.38 (1.26)	2.72 (1.06)	$t\,(164) = 3.55^{**}$
Soft Drink - AIVEs	(*n* = 98)	(*n* = 70)	
Presence	4.84 (.85)	4.06 (.96)	$t\,(165) = 5.50^{***}$
Novelty	5.31 (1.22)	4.20 (1.19)	$t\,(166) = 5.85^{***}$
Attention	5.36 (1.06)	4.45 (1.27)	$t\,(166) = 5.08^{***}$
Cybersickness	1.92 (.99)	1.31 (.59)	$t\,(166) = 4.64^{***}$
Enjoyment	4.60 (1.14)	3.71 (1.42)	$t\,(166) = 4.48^{***}$
Product knowledge	3.67 (1.46)	3.34 (1.23)	$t\,(166) = 1.58$
Advertising attitudes	5.33 (1.28)	4.93 (1.22)	$t\,(166) = 2.02^{*}$
Brand attitudes	4.88 (1.08)	4.56 (1.32)	$t\,(166) = 1.70^{\dagger}$
Purchase intention	3.69 (1.31)	3.39 (1.39)	$t\,(166) = 1.43$
Fast Food - KFC	(*n* = 72)	(*n* = 69)	
Presence	4.36 (1.02)	3.62 (1.09)	$t\,(139) = 4.18^{***}$
Novelty	5.12 (1.49)	3.93 (1.24)	$t\,(139) = 5.16^{***}$
Attention	4.67 (1.27)	3.97 (1.38)	$t\,(139) = 3.15^{**}$
Cybersickness	2.04 (1.04)	1.65 (.90)	$t\,(137.7) = 2.44^{*}$
Enjoyment	4.05 (1.36)	3.39 (1.30)	$t\,(139) = 2.96^{**}$
Product knowledge	3.92 (1.29)	3.64 (1.53)	$t\,(139) = 1.19$
Advertising attitudes	5.48 (1.26)	5.05 (1.34)	$t\,(139) = 1.96$
Brand attitudes	4.14 (1.57)	4.27 (1.74)	$t\,(139) = .44$
Purchase intention	3.46 (1.60)	3.45 (1.54)	$t\,(139) = .03$

Notes: Parenthesis indicates standard deviation.
† Significant at $p < .10$, * Significant at $p < .05$, ** Significant at $p < .01$, *** Significant at $p < .001$.

Table 7: Comparisons of Stereoscopic 3-D and 2-D Advertising in MANOVA

	Adjusted mean of 3-D	Adjusted mean of 2-D	*F*-value	Partial eta squared (η_p^2)
Cellular Phone – EyeBest	(*n* = 94)	(*n* = 69)	*df* = 1, 161	.39
Presence	5.02 (.09)	4.03 (.10)	51.57***	.24
Novelty	5.50 (.12)	4.18 (.13)	55.69***	.26
Attention	5.47 (.13)	4.46 (.15)	27.04***	.14
Cybersickness	1.93 (.10)	1.75 (.11)	1.44	.01
Enjoyment	4.76 (.13)	3.76 (.15)	27.03***	.14
Product knowledge	3.10 (.13)	2.64 (.15)	5.33*	.03
Advertising attitudes	5.35 (.13)	5.04 (.15)	2.58	.02
Brand attitudes	4.73 (.12)	4.02 (.14)	14.62***	.08
Purchase intention	3.38 (.12)	2.74 (.14)	11.57**	.07
Soft Drink - AIVEs	(*n* = 97)	(*n* = 70)	*df* = 1, 165	
Presence	4.84 (.09)	4.06 (.11)	30.26***	.16
Novelty	5.34 (.12)	4.20 (.14)	37.30***	.18
Attention	5.37 (.12)	4.45 (.14)	25.73***	.14
Cybersickness	1.93 (.09)	1.31 (.10)	21.89***	.12
Enjoyment	4.62 (.13)	3.71 (.15)	21.03***	.11
Product knowledge	3.68 (.14)	3.34 (.16)	2.53	.02
Advertising attitudes	5.33 (.13)	4.93 (.15)	4.13*	.02
Brand attitudes	4.89 (.12)	4.56 (.14)	3.03†	.02
Purchase intention	3.68 (.14)	3.39 (.16)	1.89	.01
Fast Food - KFC	(*n* = 72)	(*n* = 69)	*df* = 1, 139	
Presence	4.36 (.12)	3.62 (.13)	17.48***	.11
Novelty	5.12 (.16)	3.93 (.17)	26.60***	.16
Attention	4.67 (.16)	3.97 (.16)	9.90**	.07
Cybersickness	2.04 (.11)	1.65 (.12)	5.93*	.04
Enjoyment	4.05 (.16)	3.39 (.16)	8.75**	.06
Product knowledge	3.92 (.17)	3.64 (.17)	1.40	.01
Advertising attitudes	5.48 (.15)	5.05 (.16)	3.83†	.03
Brand attitudes	4.14 (.20)	4.27 (.20)	.19	.00
Purchase intention	3.46 (.19)	3.35 (.19)	.00	.00

Notes: Parenthesis indicates standard error.
† Significant at $p < .10$, * Significant at $p < .05$, ** Significant at $p < .01$, *** Significant at $p < .001$.

Pre- vs. Post Attitude Changes in the Responses to the KFC Ad

By measuring the attitudes toward KFC before and after the stimulus exposure, we could identify the immediate changes in brand attitude and purchase intention. Zillmann's excitation-transfer theory (1996) explains that physiological arousal diminishes slowly after media exposure, and therefore, a high level of arousal left is interpreted as positive cognitions (e.g., Moorman et al. 2002). This enabled us to assume that one's emotional status would be maximized right after media exposure. Statistically speaking, it was expected that there would be immediate changes in both brand attitude and purchase intentions (see Table 8). Indeed, a repeated measure identified a significant difference in both measures after advertising exposure. In particular, participants in the 3-D condition had more significantly changed attitudes than those in the 2-D condition. Thus, stereoscopic 3-D advertising was effective in generating immediate attitude changes, and as such, this new format of advertising appears to be more time- and cost-efficient than the 2-D format of advertising.

Table 8: Repeated Measures of Attitude Changes in KFC

		Pre-attitude	**Post-attitude**	***F*-value**	**Partial eta Squared (η_p^2)**
Brand attitude	3-D	3.67 (1.63)	4.16 (1.57)	F (1, 70) = 16.11***	.19
	2-D	4.09 (1.45)	4.27 (1.74)	F (1, 68) = 1.41	.02
Purchase intention	3-D	2.77 (1.34)	3.46 (1.60)	F (1, 71) = 20.87***	.23
	2-D	3.11 (1.31)	3.45 (1.54)	F (1, 68) = 5.05*	.07

Notes: Parenthesis indicates standard deviation.
* Significant at $p < .05$, *** Significant at $p < .001$.

Testing the Proposed Model

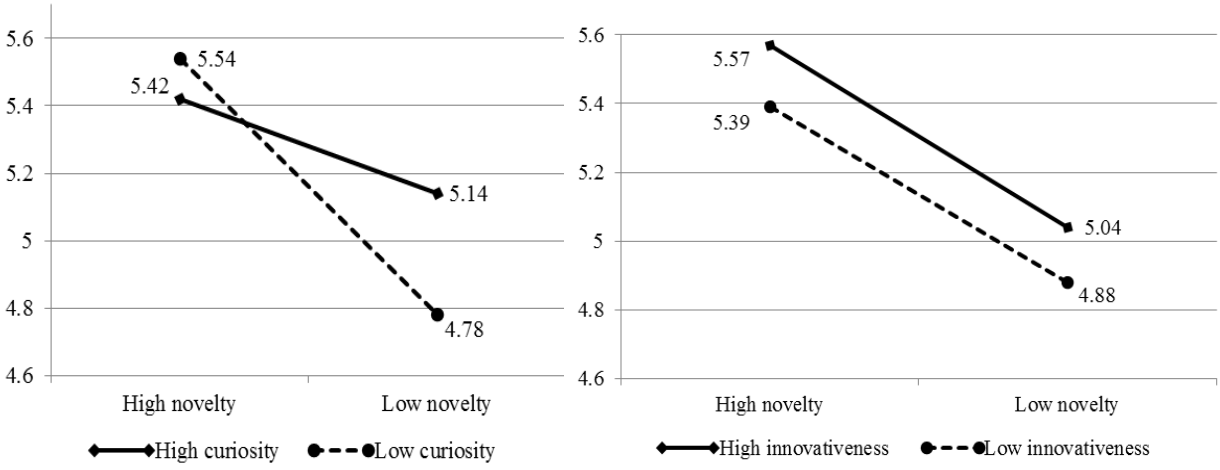
Testing the proposed hypotheses consisted of two parts: 1) examining the moderating effects of innovativeness and curiosity (H2b and H2c) and 2) running the analysis of SEM to test the rest of the hypotheses. The analyses were conducted based on the samples from three different conditions: 3-D, 2-D, and combined 3-D and 2-D. All the reliabilities of the measures used in the analyses exceeded the suggested guideline of .70 (Hair et al. 1998).

Model Based on 3-D Condition

The model was first tested on the 3-D condition. The analyses are described below, and the results are summarized in Figure 9 and 10.

Figure 9: Testing Moderating Effects of Curiosity and Innovativeness in 3-D Condition

Notes: DV = attention to the ad.



Moderating Effect of Innovativeness/Curiosity. A total of 267 participants were assigned to the 3-D condition that included the ads for the cellular phone, soft drink, and fast food. We first tested the moderating effects of curiosity (H2b) and innovativeness

(H2c) on the relationship between media novelty and attention. H2b and H2c similarly stated that for subjects with high-curiosity/innovativeness, high media novelty would be more effective in increasing attention than low media novelty. In contrast, subjects with low-curiosity/innovativeness would be less influenced by media novelty. Therefore, it was expected that there would be significant statistical interactions involving curiosity/innovativeness, media novelty, and attention. Curiosity, innovativeness, and media novelty were categorized into high vs. low based on the median split value (for more details, refer to Zhang 1996). An ANOVA (analysis of variance) was performed with attention to the ad as the dependent variable and curiosity, innovativeness, and media novelty as the independent variables. As shown in Figure 9, the results revealed that curiosity had a marginally significant moderating effect on the relationship between media novelty and attention to the ad (F (1, 259) = 2.78, $p < .10$), while innovativeness did not (F (1, 259) = .01, *n.s.*). However, the direction of the moderating effect of curiosity on attention to the ad was counter to what was hypothesized – those with high curiosity paid more attention to the ad than those with low curiosity, even when stereoscopic 3-D was perceived as a low novel medium. Therefore, H2b and H2c were not supported.

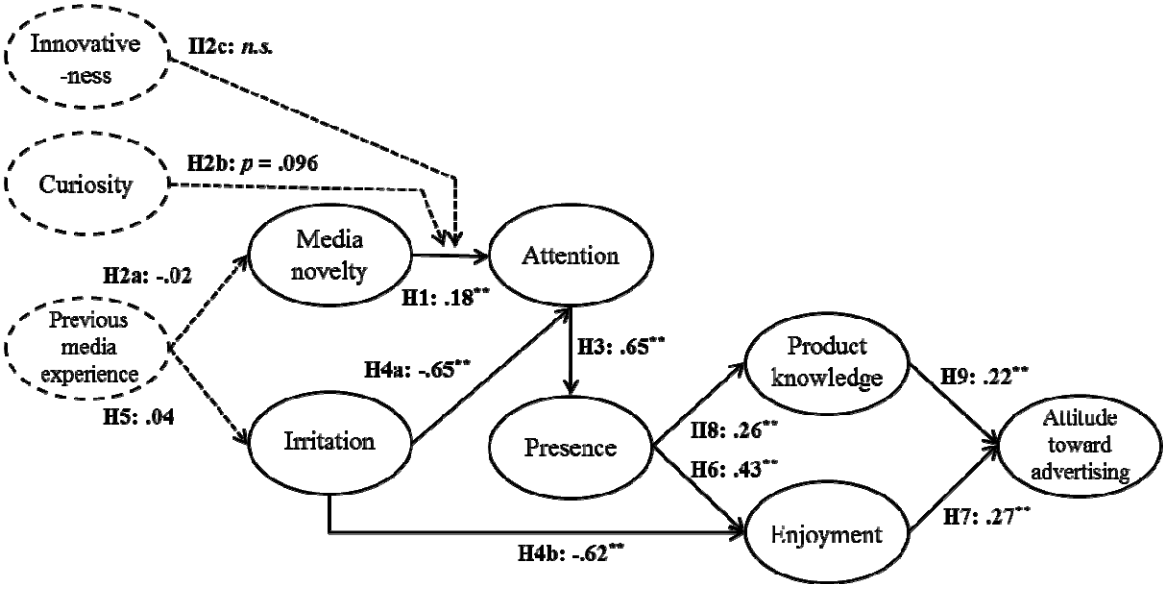
Next, we tested the rest of proposed hypotheses using SEM. First, the assumption for SEM was tested using the Kolmogorov-Smirnov test of normality.

Assumption Check. The test result found that some variables were not normally distributed (e.g., cybersickness, novelty); therefore, the assumption of the maximum likelihood (ML) method of estimation was violated, and the Bollen-Stine bootstrapping

procedure (Bollen and Stine 1992; Mangin and Alonso 2006) was employed as a supplemented test to the conventional chi-square test of fit. The test results indicated an insignificant chi-square value, which was larger than the critical value of .05 (Bollen and Stine 1992). That is, the results illustrated that the model fit the data very well. For more robust findings, we also conducted a bootstrapping ML procedure based on n = 1,000. The significance of path coefficients was reported based on 95 percent of bias-corrected confidence intervals.

Testing the Model. The initial model did not show an appropriate model fit: $\chi^2(1527) = 3038.48$, $p < .001$, CFI = .82, TLI = .81, RMSEA = .06, given that the fit indices of CFI and TLI are required to exceed the acceptable values of .90 and RMSEA must be smaller than .06 (Kelloway 1998). This was mainly because of improperly loaded items in the measure of presence, which consisted of 24 items. Some of the items in the measure of presence were irrelevant to the context of stereoscopic 3-D (e.g., How much were you able to control events? How responsive was the environment to actions that you initiated?). To improve the model fit, all the insignificant observed items in the latent variables first were removed. Afterward, the items with the factor loadings that were smaller than .4 were dropped (e.g., for more details, refer to Lee and Choi 2006). Finally, based on the modification index suggested by AMOS 18.0, some more items were removed, which resulted in the goodness of fit of a statistical model: $\chi^2(548) = 799.03$, $p < .001$, CFI = .95, TLI = .95, RMSEA = .04.

Figure 10: Testing the Model Based on 3-D Condition



Notes: * Significant at $p < .05$, ** Significant at $p < .01$.

The significance of the paths in the model determined whether the proposed hypotheses were supported or not. As shown in Figure 10, a majority of paths were statistically significant, as predicted, while the hypotheses related to users' characteristics were not supported (H2a and H5). Specifically, media novelty resulted in attention (H1), leading to presence (H3), while irritation reduced attention to the ad (H4a). The enhanced presence had a positive impact on both enjoyment (H6) and product knowledge (H8), resulting in more favorable attitudes toward advertising (H7 and H9).

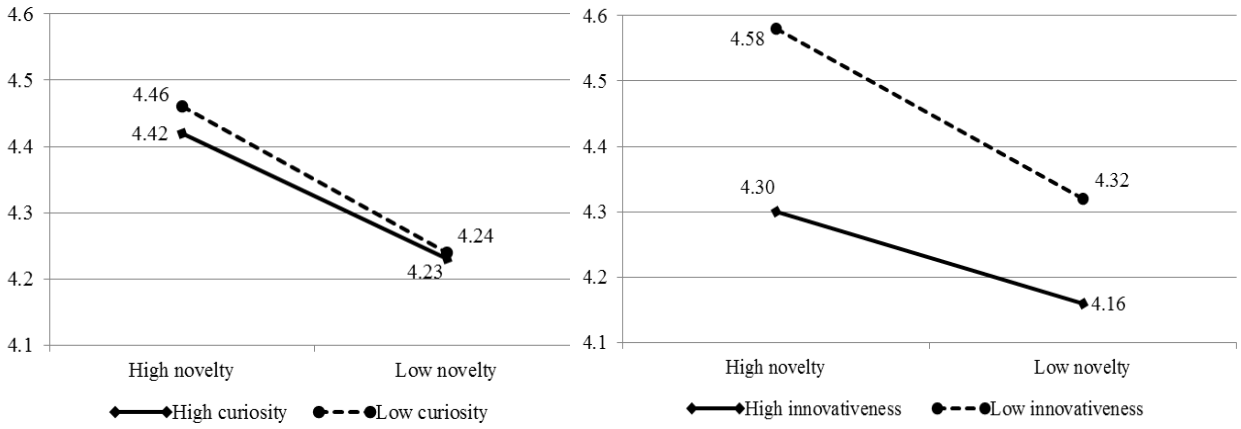
Model Based on 2-D Condition

The same analysis procedure was applied in testing the hypotheses based on the sample from the 2-D condition, which included the ads for the cellular phone, soft drink, and fast food ($n = 209$). First, we tested the moderating effects of curiosity and

innovativeness on the relationship between media novelty and attention (H2b, c), but no significant moderating effects were detected (see Figure 11). Thus, H2b and H2c were not supported in the 2-D condition.

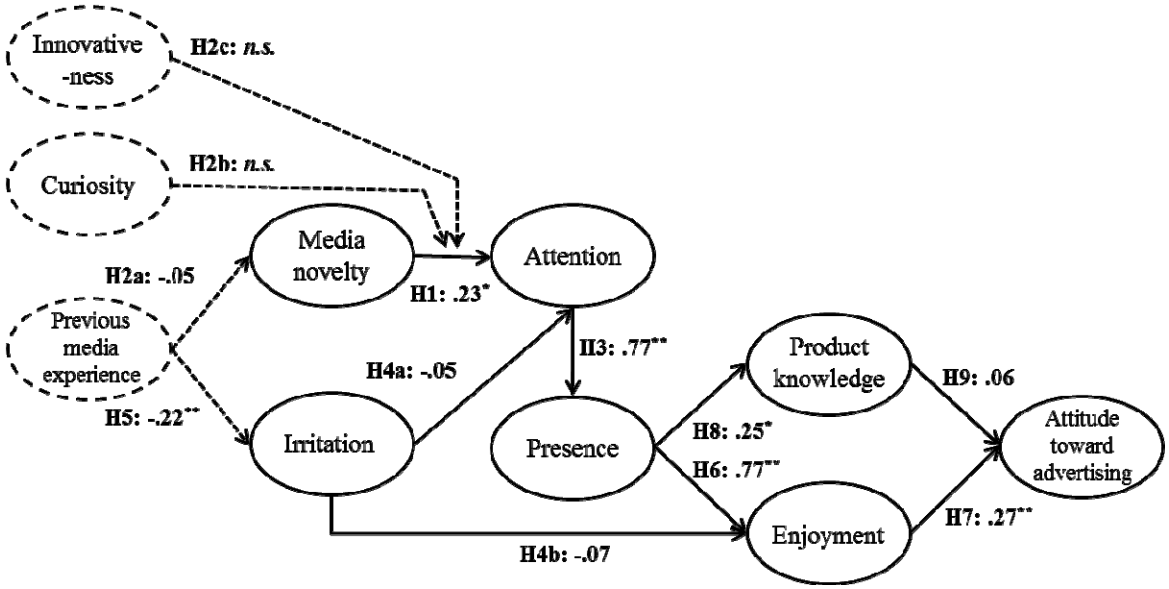
Figure 11: Testing Moderating Effects of Curiosity and Innovativeness in 2-D Condition

Notes: DV = attention to the ad.



Assumption Check. The samples from the 2-D condition were also identified as a non-normal data, mainly due to the measures of cybersickness (skewness and kurtosis > 1.96). Therefore, to have more robust results, we conducted the bootstrapping analysis based on n = 1,000 (Bollen and Stine 1992).

Figure 12: Testing the Model Based on 2-D Condition



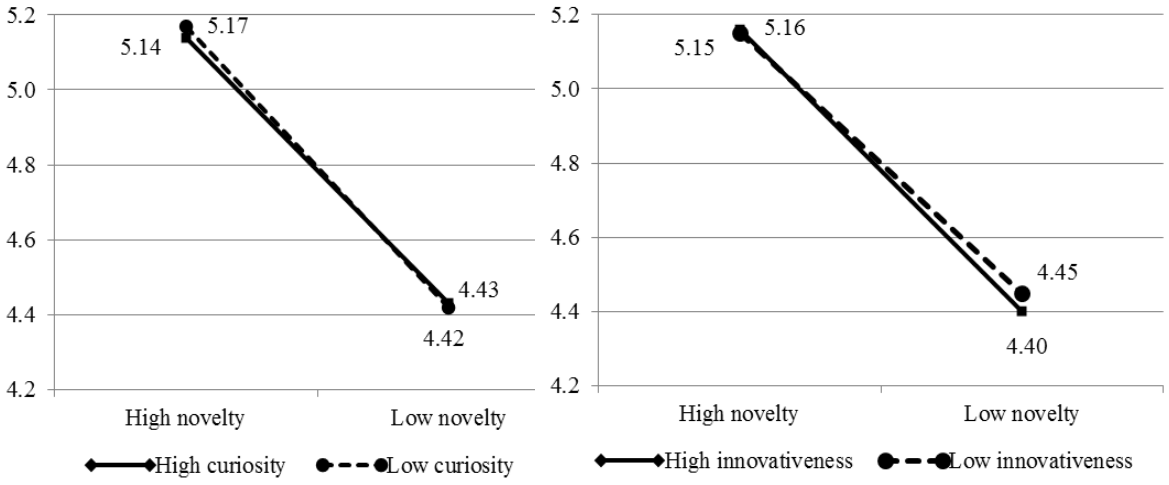
Notes: * Significant at $p < .05$, ** Significant at $p < .01$.

Testing the Model. As in the previous SEM analysis based on the sample from the 3-D condition, the same efforts were made to obtain an appropriate model fit based on the sample from the 2-D condition. That is, after removing some of the observed items that did not have proper factor loadings, the proposed model came had a proper level of goodness of fit: $\chi^2(517) = 813.21$, $p < .001$, CFI = .92, TLI = .91, RMSEA = .05 (see Figure 12). Cybersickness (irritation) did not play a role as an irritation that hindered ad viewers' attention to the ad ($\beta = -.05$, *n.s.*) or negatively affected their mood state ($\beta = -.07$, *n.s.*) in the 2-D condition; therefore, it was concluded that 2-D content/media did not elicit any type of discomfort in viewing the ad. However, the results revealed a significant negative relationship between previous media experience and irritation (i.e., cybersickness) ($\beta = -.22$, $p < 01$), suggesting that viewers who spent more time watching

television (i.e., 2-D condition) tended to experience fewer negative effects caused by irritation. Another interesting finding was that the increased product knowledge did not significantly improve attitudes toward advertising as it did in the 3-D condition (β = .06, *n.s.*). We speculated that this was because the product knowledge stimulated by the 2-D display was not high enough to enhance ad viewers' attitudes toward the ad, compared with the 3-D display (t (474) = 2.51, $p < .05$, M_{3D} = 3.53, SD = 1.40, M_{2D} = 3.21, SD = 1.37).

Figure 13: Testing Moderating Effects of Curiosity and Innovativeness in 3-D and 2-D Conditions

Notes: DV = attention to the ad.



Model Based on Combined Samples from 3-D and 2-D Conditions

First, the reliability and validity of all the measurements were confirmed on the combined sample, and then the same analysis procedure was used as in the previous tests of the model. There were no significant moderating effects for curiosity and

innovativeness (H2b, H2c), as shown in Figure 13. However, there was a significant and strong main effect of media novelty on attention to the ad (F (1, 468) = 36.56, p < .001).

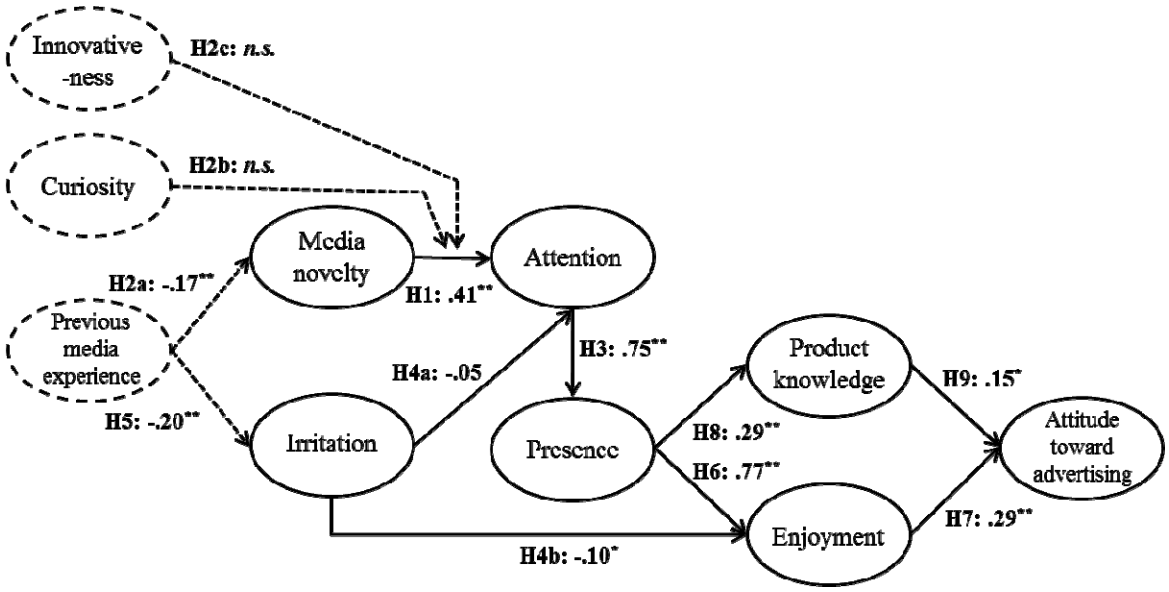
Reliability and Validity. Before testing the proposed model based on the combined samples, scale reliability and validity (convergent and discriminant validity) were tested. Cronbach's α was adopted to test the reliability of each latent variable, and the results revealed that all the measures exceeded the suggested guideline of .70 (Hair et al. 1998) (for more details, see Appendix A). Convergent validity was examined by checking 1) whether the factor loadings of each latent construct were significant (Anderson and Gerbing 1988) and 2) whether each construct's average variance extracted (AVE) was beyond the suggested value of .50 (Fornell and Larcker 1981). The results indicated that the values were acceptable for all the constructs except for presence, whose AVE was .42. The comparison of the AVE with the squared correlation (ϕ^2) between the factor and each of the other constructs confirmed discriminant validity, indicating that the AVE for each construct was greater than its squared correlation (ϕ^2) (Lichtenstein, Netemeyer, and Burton 1990).

Next, the fit of the measurement model for each construct was tested, and all the constructs illustrated a proper level of model fit. For example, the fit for presence was: χ^2 (27) = 99.23, CFI = .95, TLI = .94, RMSEA = .08; enjoyment: $\chi^2(9)$ = 24.60, CFI = .99, TLI = .99, RMSEA = .06. Finally, after conducting the assumption check, all the confirmed measurement models were combined as the hypotheses proposed.

Assumption Check. Similar to the previous analyses, the samples were non-normal data, so a bootstrapping analysis was adopted to have rigorous results based on n = 1,000.

The significance of all path coefficients were also reported based on 95 percent of bias-corrected confidence intervals.

Figure 14: Testing the Model Based on 3-D and 2-D Conditions



Notes: * Significant at $p < .05$, ** Significant at $p < .01$.

Testing the Model. Given the combined samples from 3-D and 2-D conditions provided greater variance on key variables, such as media novelty and presence, the model test results from the combined samples were likely to be the most appropriate in terms of theoretical interpretations. The SEM analysis results illustrated that in that pool of samples, the suggested model had a proper level of goodness of fit: χ^2 (550) = 1057.47, $p < .001$, CFI = .95, TLI = .95, RMSEA = .04 (see Figure 14). The test results supported most of the proposed hypotheses. However, irritation did not have a significant negative impact on viewers' attention to the ad (β = -.05, *n.s.*). This finding was interpreted to

mean that cybersickness (i.e., irritation) did not actually bother ad viewers in paying attention to media in general.

Finally, all the results based on both conditions are reported in Table 9. In summary, presence generated both enjoyment and enhanced product knowledge that generally resulted in more favorable attitudes toward the ad in all the conditions. Cybersickness was a primary irritation that reduced attention to the ad and enjoyment in the 3-D condition. Previous media experience had a negative impact on media novelty when the model was tested on the combined samples (3-D + 2-D). Innovativeness and curiosity did not play a role as moderators that enhanced ad viewers' attention to the ad in any of the analyses.

Table 9: Summary of Model Testing Results

			3-D	2-D	3-D + 2-D
Innovativeness [m]	→	(Media novelty → Attention)	*n.s.*	*n.s.*	*n.s.*
Curiosity [m]	→		$p = .096$	*n.s.*	*n.s.*
Previous media experience	→	Media novelty	-.02	-.05	-.17**
	→	Irritation	.04	-.22**	-.20**
Media novelty	→	Attention	.18**	.23*	.41**
Irritation	→	Attention	-.65**	-.05	-.05
	→	Enjoyment	-.62**	-.07	-.10*
Attention	→	Presence	.65**	.77**	.75**
Presence	→	Product knowledge	.26**	.25*	.29**
	→	Enjoyment	.43**	.77**	.77**
Product knowledge	→	Attitude toward advertising	.22**	.06	.15*
Enjoyment	→	Attitude toward advertising	.27**	.27**	.29**

Notes: [m] indicates moderating effect, * Significant at $p < .05$, ** Significant at $p < .01$.

CHAPTER 5: Discussion and Conclusion

In this chapter, the findings are discussed, and the contributions of this study are highlighted. In addition, possible explanations for insignificant hypotheses are suggested. The limitations of this study are identified, and directions for future research are considered.

DISCUSSION

The purpose of the current study was to propose a new advertising model that can expand the theoretical knowledge of how advertising works embedded in a new, innovative medium. Reflecting the rapid advances in technology and the continually changing media environment, it is important to understand the impact of media, isolated from advertising content or messages, to assess the overall advertising effects more appropriately.

The proposed model and our findings highlighted the prominent roles of media novelty and presence in enhancing advertising effectiveness. The novelty effect, created by the newness of the stereoscopic 3-D medium, had the power to attract viewers' attention, and the increased attention enhanced the viewers' sense of presence, the experience of being plunged into a new, virtual world that advertisers constructed (Kim and Biocca 1997; Witmer and Singer 1998). These sequential relationships can result in positive measures of advertising effectiveness, such as improved product knowledge and increased enjoyment. In addition, these relationships can result in more favorable attitudes toward the ad. Also our findings revealed that an irritation effect, such as

cybersickness in the stereoscopic 3-D condition, can hinder ad viewers' communication processes and reduce their attention to the ad and enjoyment of it. The model predicted user characteristics, such as innovativeness, curiosity, and previous experience with the medium, would affect the process, but no effects were found. The findings are discussed in more detail below.

Stereoscopic 3-D Display as a Tool to Prompt Advertising Effectiveness

Comparisons of stereoscopic 3-D and 2-D advertising highlighted the important role that the stereoscopic 3-D display can play in enhancing advertising effectiveness. Given that the content included in both conditions was identical, the significant differences in the comparisons were only due to media effects.

Specifically, the stereoscopic 3-D display was a more innovative and influential medium for advertising effectiveness than the 2-D display. As seen in the tests of ads for all three products (i.e., cellular phone, soft drink, and fast food), the stereoscopic 3-D display consistently generated greater novelty, presence, attention, and enjoyment than the 2-D display. Since these variables are linked to persuasion, improved recall, and recognition (Carver and Scheier 1981; Donohew et al. 2002), our results provided compelling evidence of the potential of stereoscopic 3-D as an advertising medium that will improve advertising effectiveness. More interestingly, the stereoscopic 3-D display had the power to stimulate immediate changes in attitudes. As shown in the repeated measures of attitudes toward KFC, stereoscopic 3-D advertising significantly changed ad viewers' attitudes immediately after advertising exposure, while 2-D advertising had a moderate or little impact on attitude changes. Advertising campaigns typically are based

on the premise that repeated exposures are needed to change viewers' attitudes, which involves time and money, so the increased efficiency of stereoscopic 3-D in changing attitudes appears promising.

While the overall results showed some positive significant differences for stereoscopic 3-D advertising, the three advertising stimuli showed inconsistent results in the outcome variables, such as attitudes toward advertising and brand and purchase intention. Specifically, the 3-D ad for the cellular phone was significantly better than the 2-D ad in generating positive attitudes toward brand ($p < .001$) and purchase intentions ($p < .01$). Also, the 3-D ad for the soft drink was significantly better than the 2-D ad in generating positive attitudes toward advertising ($p < .05$) but not in generating positive brand attitudes ($p < .10$). Furthermore, the 3-D ad for fast food did not show any significant differences compared to the 2-D ad. We offer some speculations regarding why the 3-D ads for the cellular phone and the soft drink performed better than the 3-D ad for fast food. First, as predicted by the model, ads that generated higher presence could produce more positive measures of advertising effectiveness. That is, the two ads that generated a higher sense of presence, the cellular phone and the soft drink, produced significantly more positive evaluations from ad viewers ($M_{cellular\_phone} = 5.01$, $M_{soft\_drink} = 4.84$ vs. $M_{fast\_food} = 4.36$). Another possible explanation is that product properties and content effects affected ad viewers' evaluation processes. For example, much of the power of the stereoscopic 3-D display lies in its enhanced visual presentations, and since the ad for the soft drink only presented a container, the ad might not have benefited from the technological advantages of the medium. As such, the 3-D ad would not be expected

to stimulate purchase intentions more than the 2-D format. More importantly, what is conveyed to ad viewers, the ad content, can be as important an issue as how to the information is conveyed, the medium. Currently, in light of the obesity crisis in the U.S., many people have negative views of fast food due to its high fat content (Rabin 2009), and thus, it might be impossible for any medium, irrespective of format, to generate favorable evaluations. Moreover, in addition to the product category, the ad content or message can play an important role of evaluation processes. The ad content has the power to attract ad viewers' attention. For example, there was no difference in attitudes toward the ad for cellular phone in the 3-D vs. the 2-D condition (t (165) = 1.51, *n.s.*, M_{3D} = 5.34 vs. M_{2D} = 5.50), although the 3-D ad generated a significantly higher sense of presence than the 2-D ad (t (163) = 7.13, $p < .001$, M_{3D} = 5.01 vs. M_{2D} = 4.03). Perhaps the ad content was so compelling that it negated the effects of the increased presence created by the novel medium. Irrespective of the explanation, this finding indicates that the media effect is not the only factor in determining general advertising effectiveness, and it should be understood as just one of the tools that can enhance advertising strategies. That is, advertising effectiveness will be maximized when the content and the media are ideally combined.

The Contributions of Consumer Media Experience Model

The current study aimed to construct an alternative advertising model that accounts for the impact of a new, innovative medium. The model is the first advertising model that emphasizes the roles of the medium, isolated from content effects, in creating general advertising effectiveness. Current media are evolving rapidly, and diverse new

media will continuously emerge in the future. For example, TV commercials are now adopting stereoscopic 3-D technology; digital signage that allows advertisers to control content is replacing billboard outdoor advertising; traditional radio is broadcast in HD sound (High Definition), which has superior sound quality; holograms that show 360-degree images of objects are about to be employed as an advertising tool. As such, advertisers will have to choose among increasingly diverse media vehicles to convey their messages, and choosing the most effective option will become an increasingly important issue. The proposed model will allow advertisers to predict advertising effectiveness within the context of innovative media options, and as such can provide guidance in which type of media to select. The model certainly highlights the importance of considering media power in estimating general advertising effectiveness.

Second, the model and our findings provided direct evidence pertaining to how stereoscopic 3-D advertising works and how this technology can advance the consumer media experience. As many sources have reported, the emergence of stereoscopic 3-D technology is one of the most notable technological advances (e.g., Waxman 2007), and it is expected to influence media uses in almost all the domains that display images, such as movies, video games, laptops, photo frames, and digital cameras. For example, the most frequent use of stereoscopic 3-D technology has been within the movie industry (Cohen 2009). More than 20 3-D movies have been released to the public in the past five years. Influenced by the success of mega-blockbuster "Avatar 3-D," another 50 stereoscopic 3-D movies are being produced by famous directors, including Peter Jackson and Steven Spielberg (Cohen 2009; Waxman 2007; Wolverton 2009). In the domain of

video games, 15 to 25 stereoscopic 3-D based console games were released last year, and the number is expected to increase by around 100 percent in 2011 (Insight Media 2009). As a result, the many uses of stereoscopic 3-D technology have encouraged advertisers to adopt it as a marketing tool. Samsung Electronics, Toyota, and Skittles (Contrino 2009) have recently released stereoscopic 3-D movie advertisements, and VISA has launched the first stereoscopic 3-D outdoor advertising in New York's Grand Central Terminal (Bachman 2010). The findings in the study illustrated the strengths (e.g., ability to generate presence) and weaknesses of this new technology (e.g., cybersickness) and provided impetus to maximize the uses of this new technology.

Third, our findings highlighted the important role of presence in generating advertising effectiveness by providing insights regarding the process through which presence plays its role. It is well known that presence creates various positive marketing outcomes, such as favorable attitudes toward the ad, brand, and purchase intention in the context of TV commercials, websites, and video games (e.g., Coyle and Thorson 2001; Hopkins, Raymond, and Mitra 2004; Li, Daugherty, and Biocca 2001, 2002; Suh and Lee 2005). However, prior research had provided few insights into the process through which presence enhances advertising effectiveness. This study empirically demonstrated presence allows ad viewers to experience enjoyment and to learn about products, and through this process, it enhances advertising effectiveness.

Finally, the model posited relationships between consumer traits – previous media experience, curiosity, and innovativeness – and advertising effectiveness. Although the model only showed partial support for these relationships, the results do add to our

understanding of how individuals perceive advertising within new, innovative media environments. According to the model test based on the combined samples from the 3-D (new medium) and 2-D (old medium) conditions, previous media experience had both positive and negative effects on advertising perceptions. That is, while previous media experience alleviated the discomfort or shortcoming of media irritation (β = -.20, p < .01), it also simultaneously eliminated the benefit from media novelty (β = -.17, p < .01). The finding implied that adopting new innovative media options may not be as beneficial as once thought. Media novelty appeared to have a shelf life, and its effects can wear out as individuals gain media experience. In addition, our findings illustrated that personal traits such as innovativeness and curiosity do not significantly enhance ad viewers' attention to novel stimuli, and thus future researchers are encouraged to seek other individual characteristics that might heighten attention levels, such as personal involvement in new technology.

Alternative Explanations for Insignificant Hypotheses

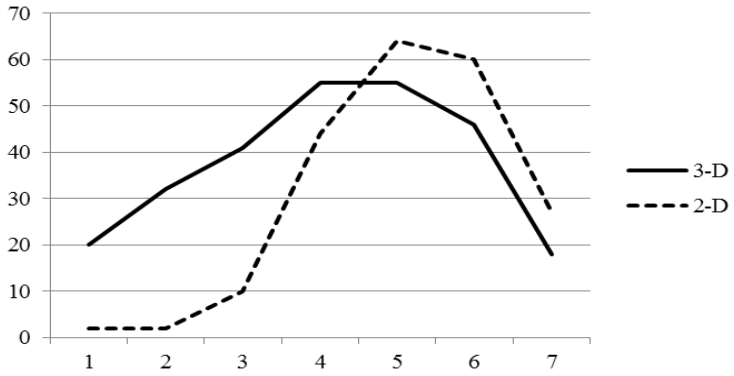
While a majority of the proposed hypotheses were supported, some hypotheses were not supported, so alternative explanations are necessary. Specifically, previous media experience did not have any significant influence on media novelty (β = -.02, *n.s.*) or irritation (i.e., cybersickness + wearing glasses) (β = .04, *n.s.*) in the 3-D condition. There was a significant negative relationship between previous media experience and irritation (i.e., cybersickness) (β = -.22, p < .01) in the 2-D condition, but no significance was detected in the path between previous media experience and media novelty (β = -.05, *n.s.*). Interestingly, both relationships were significant when they were tested based on the

combined samples (3-D + 2-D) (previous media experience → media novelty: β = -.17, p < .01; previous media experience → irritation: β = -.20, p < .01). One possible explanation is that many participants experienced cybersickness as an irritation while watching stereoscopic 3-D display, even though they believed that they were familiar with the 3-D display. In other words, measuring previous media experience based on media familiarity might be problematic. To reduce the negative impact of cybersickness, people would need to have more media experience with stereoscopic 3-D technology. However, when previous media experience was measured based on media familiarity, participants who had much knowledge about stereoscopic 3-D technology could rate themselves similar to individuals who reported having much previous media experience of stereoscopic 3-D. Another possible explanation is that people may not perceive stereoscopic 3-D technology to be new or innovative, since many news sources have frequently reported on it and many movies using it have been released. The explanation is implicitly supported by the fact that many participants had already watched stereoscopic 3-D movies (M = 4.78, SD = 1.91; 1 = less experienced, 4 = moderate, 7 = heavily experienced).

As for the reason why there was no significant relationship between previous media experience and media novelty in the 2-D condition, it is assumed that a ceiling effect came into play in that relationship. Because almost all people today are using 2-D screens, media novelty would not be salient, and previous media experience would be dominant ($M_{media\_experience}$ = 5.43, SD = 1.13, $M_{novelty}$ = 4.10, SD = 1.15).

Interestingly, the model tested based on the combined samples of the 3-D and 2-D conditions supported many hypotheses, as expected. That was because the combined samples represented users who viewed 3-D and 2-D differently in terms of newness, the former being a new medium and the latter considered to be an old medium. Specifically, the combined samples represented ad viewers' evaluations of ads embedded in both the new and old media (t (474) = 7.80, $p < .001$, $M_{3D\_media\_expereicne}$ = 4.39, SD = 1.65 vs. $M_{2D\_media\_experience}$ = 5.43, SD = 1.13). Statistically speaking, the measure of "previous media experience" probably was more diverse and normally distributed, compared to the samples from the 3-D or the 2-D condition (see Figure 15). That is, for this reason, the model was able to detect significant relationships among previous media experience, media novelty, and irritation.

Figure 15: Sample Distributions of "Previous Media Experience"



Notes: 3-D as a new medium, 2-D as an old medium.

Unexpectedly, the results did not identify any significant moderating effects of innovativeness or curiosity on the relationship between media novelty and attention to ad. We predicted that people with high innovativeness or high curiosity would pay more

attention to novel media, since the technological novelty would enhance their desire to explore and pay attention to the stimuli (Day 1982; Hirschman 1980; Roehrich 2004). However, this did not occur, and an alternative explanation is required. According to some psychology literature, people's motivation for exploratory behavior operates when their need to know is stimulated (Loewenstein 1994). In other words, although people are highly innovative or highly curiosity, they may not be willing to pay attention to things that are not of concern to them or which they do not perceive to be novel or new. It is possible that many participants in the study did not perceive stereoscopic 3-D technology as an object of great interest that would stimulate their interest or involvement.

LIMITATIONS AND FUTURE RESEARCH

While the current study tried to provide a comprehensive model of assessing advertising embedded in a new, innovative medium, the exploratory nature of this study had some limitations. First of all, the proposed model is most suitable for predicting advertising effectiveness within a new, innovative medium (e.g., stereoscopic 3-D, hologram, touchscreen), rather than a traditional medium (e.g., newspaper, magazine). This is mainly because traditional media would be not likely to generate enough media novelty to attract a high degree of attention from ad viewers. As such, as the novelty of a medium wears off and viewers become bored with it (Tellis 1997). One of the ways to avoid this limitation would be to incorporate into the model novelty effects caused not only by media but also by content. This change would allow the model to explain how and when advertising within a traditional medium could be more effective than advertising in a new, innovative medium. Therefore, future researchers are encouraged to

enhance the model by adding some factors related to viewers' evaluations of ad content, especially its innovativeness. By doing so, researchers would be also able to avoid the possible difficulty of differentiating media effect from content effect.

Another limitation is that the proposed model was tested based on a medium focusing on vividness – stereoscopic 3-D technology – so the findings might be limited to the context of stereoscopic 3-D advertising and other similar media. Many other formats of media focus on interactivity, and thus, future researchers should replicate the current study based on more diverse new media. For example, testing the model within the context of augmented reality or touchscreen would lead to more rigorous and generalizable findings (e.g., Multi-group comparison SEM).

Third, this study is also limited in the fact that only three product categories were used, and all the products were perceived as relatively low involvement ($3.70 < M_{involvement} < 3.87$). As such, testing the model with ads for a more diverse set of products that includes high involvement purchases would be helpful. Considering the Elaboration Likelihood Model (Petty and Cacioppo 1981), it is assumed that a stereoscopic 3-D display in an ad for a low involvement product might be perceived as a technological amusement that can easily trigger ad viewers' sense of pleasure (enjoyment) (Petty, Cacioppo, and Schumann 1983); if so, it would serve as a peripheral cue in ad viewers' information processing (Petty and Cacioppo 1981). We wonder whether stereoscopic 3-D display could serve a role as a central cue in ads for high involvement products, such as luxury goods. Future researchers are encouraged to empirically test these ideas.

Fourth, the model's outcome variable is attitudes toward advertising, and the model does not encompass possible relationships among attitudes toward advertising, brand attitudes, and purchase intentions. Future researchers may suggest a more extensive model that also includes other important outcome variables, such as brand attitudes and purchase intentions.

Finally, the current findings are limited to the responses of college students. Given that college students are relatively more upscale and technologically savvy than the general population, the results may be different when the model is tested on respondents with a different demographic profile. Specifically, older participants might experience a higher sense of media novelty than college students. Therefore, the future researchers are encouraged to replicate the model test on a more varied population.

CONCLUSION

The purpose of the study was to provide a comprehensive framework that explains how consumer media experiences within a new, innovative medium are associated with advertising effectiveness. Several concerns about previous models motivated the development of this model. For instance, previous traditional advertising models have focused on message recipients' characteristics and information processes, ignoring the significant role of media in understanding advertising effectiveness (e.g., Greewald and Leavitt 1984; Grunert 1996; MacInnis and Jaworski 1989; Meyers-Levy and Malaviya 1999; Vakratsas and Ambler 1999; Vaughn 1980). Recently developed advertising models dealing with the impact of media on advertising effectiveness have been narrowly applied to a specific medium, the Internet, and have focused largely on

interactivity (e.g., Briggs and Hollis 1997; Cho 1999; Maddox, Mehta, and Daubek 1997; Macias 2003; Rodgers and Thorson 2000). Also, the relationships between the key constructs, such as media novelty and presence, warranted more careful consideration and examination. The current research provided advertising practitioners and researchers with opportunities to consider the significant role of media in assessing overall advertising effectiveness in an innovative new medium that emphasizes vividness rather than interactivity – stereoscopic 3-D. It also provides important insights regarding media novelty and presence. As such, our model incorporates and extends the theoretical and practical insights of other researchers.

Appendix A: Scale Items

Item	CFA Standardized Loading	AVE	ϕ^2
Previous Media Experience (α = .92)		.86	.00 - .04
Unfamiliar – Familiar	.92		
Inexperienced – Experienced	.95		
Not knowledgeable – Knowledgeable	.91		
Media Novelty (α = .87)		.64	.00 - .19
New	.90		
Unique	.89		
Different	.72		
Unusual	.66		
Attention to Media (α = .87)		.73	.00 - .42
Not deeply engrossed – Deeply engrossed	.88		
Not absorbed intently – Absorbed intently	.99		
My attention was not focused – My attention was focused	.66		
Cybersickness (α = .78)		.58	.00 - .04
To what degree did you experience nausea while watching the advertising?	.78		
To what degree did you experience dizziness with your eyes open while watching the advertising?	.81		
To what degree did you experience dizziness with your eyes closed while watching the advertising?	.68		
Presence (α = .86)		.42	.00 - .28
How natural did your interactions with the environment seem?	.51		
How completely were *all* of your senses engaged?	.62		
How much did the visual aspects of the environment involve you?	.70		
How natural was the mechanism which controlled movement through the	.64		

environment?			
How compelling was your sense of objects moving through space?	.72		
How compelling was your sense of moving around inside the virtual environment?	.68		
How well could you examine objects from multiple viewpoints?	.62		
How involved were you in the virtual environment experience?	.80		
Were you involved in the experimental task to the extent that you lost track of time?	.49		
Enjoyment (α = .91)		.63	.00 - .42
The commercial was lots of fun to watch and listen to.	.90		
I thought it was clever and quite entertaining.	.92		
The enthusiasm of the commercial is catching – it picks you up.	.82		
The ad wasn't just selling the product – it was entertaining me. I appreciated that.	.82		
The product in the commercial captures my attention.	.68		
It's the kind of commercial that keeps running through my mind after I've seen it.	.59		
Product Knowledge (α = .78)		.59	.00 - .11
I feel very knowledgeable about this product shown in the advertising.	.61		
If a friend asks me about this product, I can give him/her advice about this product shown in the advertising.	.90		
If I have to purchase this product today, I will need to gather very little information in order to make a wise decision.	.84		
I feel very confident about my ability to tell the features of this product shown in the advertising.	.71		
Attitudes toward Advertising (α = .93)		.81	.00 - .12
Unfavorable – Favorable	.88		
Bad – Good	.95		
Negative – Positive	.87		

Item	EFA Standardized Loading
Curiosity (α = .71)	
I would describe myself as someone who actively seeks as much information as I can in a new situation.	.76
I frequently find myself looking for new opportunities to grow as a person (e.g., information, people, resources).	.83
I am not the type of person who probes deeply into new situations or things.	.69
Everywhere I go, I am out looking for new things or experiences.	.67
When I am participating in an activity, I tend to get so involved that I lose track of time.	.75
When I am actively interested in something, it takes a great deal to interrupt me.	.80
My friends would describe me as someone who is "extremely intense" when in the middle of doing something.	.71
Innovativeness (α = .90)	
In general, I am among the first in my circle of friends to buy new high-tech products (e.g., cellular phone, notebook, mp3 player), when it appears.	.90
If I heard that a high-tech product was available in the store, I would be interested enough to buy it.	.85
Compared to my friends, I often purchase a new technology product.	.90
In general, I am the first in my circle of friends to know the brand names of high-tech products.	.87
I will buy a high-tech product even if I haven't heard it yet.	.64
I know the names of high-tech product before other people do.	.85
Product Involvement (α = .92)	
Doesn't matter – Matters	.90
Unimportant – Important	.93
Useless – Useful	.88
Boring – Interesting	.80
Not needed – Needed	.91
Nonessential – Essential	.90

Brand Attitude (α = .95)	
Unfavorable – Favorable	.95
Bad – Good	.96
Negative – Positive	.95
Purchase Intention (α = .84)	
Unlikely – Likely	.90
Improbable – Probable	.92
Impossible – Possible	.82
Uncertain – Certain	.62

Notes: All the measures are a seven-point scale.
AVE = average variance extracted. ϕ^2 = the squared ϕ correlation.
EFA = exploratory factor analysis, CFA = confirmatory factor analysis.

REFERENCES

Aaker, David A., and Donald E. Bruzzone (1985), "Causes of Irritation in Advertising," *Journal of Marketing*, 49 (2), 47-57.

Aaker, David A., Douglas M. Stayman, and Richard Vezina (1988), "Identifying Feelings Elicited by Advertising," *Psychology and Marketing*, 5(1), 1-16.

Anderson, James C., and David W. Gerbing (1988), "Structural Equation Modeling in Practice: A Review and Recommended Two-step Approach," *Psychological Bulletin*, 103 (3), 411-423.

Andrews, J. Craig (1989), "the Dimensionality of Beliefs Toward Advertising in General," *Journal of Advertising*, 18 (1), 26-35.

Andrews, J. Craig, Syed H. Akhter, Srinivas Durvasula, and Darrel D. Muehling (1992), "The Effects of Advertising Distinctiveness and Message Content Involvement on Cognitive and Affective Responses to Advertising," *Journal of Current Issues and Research in Advertising*, 14 (1), 45-58.

Ang, Chen, Darst Paul W., and Pangrazi Robert P. (2001), "An Examination of Situational Interest and Its Sources," *British Journal of Educational Psychology*, 71 (3), 383-400.

Ault, Susanne (2008), "3D and 3D-ready TVs Increase in Popularity," Video Business, October 3, available at http://www.videobusiness.com/article/CA6601652.html (accessed April 1, 2010).

Bachman, Katy (2010), "Visa Tries 3-D Display in Grand Central," ADWEEK (February 2), available at http://www.adweek.com/aw/content_display/creative/news/e3i9ee4b481143e87d70a6aacbf4b7b9ab1 (accessed March 1, 2010).

Barfield, Woodrow, David Zeltzer, Thomas Sheridan, and Mel Slater (1995), "Presence and Performance within Virtual Environments," in *Virtual Environments and Advanced Interface Design*, Woodrow Barfield and Thomas A. Furness, III, eds., New York: Oxford University Press, 473-541.

Barling, Julian, and Clive Fullagar (1983), "Children's Attitudes to Television Advertisements: A Factorial Perspective," *Journal of Psychology*, 113 (1), 25-30.

Batra, Rajeev and Michael L. Ray (1986), "Affective Responses Mediating Acceptance of Advertising," *Journal of Consumer Research*, 13 (2), 234-249.

Bauer, Raymond, and Stephen A. Greyser (1968), *Advertising in America Consumer View*, Boston, MA: Harvard University.

Beerli, Asuncion and Josefa D. Martin Santana (1999), "Design and Validation of an Instrument for Measuring Advertising Effectiveness in the Printed Media," *Journal of Current Issues and Research in Advertising*, 21 (2), 11-30.

Berlyne, D. E. (1950), "Novelty and Curiosity as Determinants of Exploratory Behavior," *Journal of Psychology*, 41 (1/2), 68-80.

Berlyne, D. E. (1954), "A Theory of Human Curiosity," British Journal of Psychology, 45 (3), 180-191.

Berlyne, D. E. (1960), *Conflict, Arousal, and Curiosity*, New York: McGraw-Hill.

Berlyne, D. E. (1966), "Curiosity and Exploration," *Science, New Series*, 153 (3731), 25-33.

Berlyne, Daniel, M. Graw, P.H. Salapateck, and J. Lewis (1963), "Novelty, Complexity, Incongruity, Extrinsic Motivation and the GSR," *Journal of Experimental Psychology*, 66 (6), 560-567.

Bezjian-Avery, Alexa, Boby Calder, and Iacobucci (1998), "New Media Interactive Advertising vs. Traditional Advertising," *Journal of Advertising Research*, 38 (4), 23-32.

Biocca, Frank (1992), "Will Simulation Sickness Slow Down the Diffusion of Virtual Environment Technology?" *Presence: Teleoperators and Virtual Environments*, 1 (3), 334-343.

Biocca, Frank (1997), "The Cyborg's Dilemma: Progressive Embodiment in Virtual Environments," *Journal of Computer-Mediated Communication*, 3 (2), 12-26.

Blasko, Vincent J., and Michael P. Mokwa (1986), "Creativity in Advertising: A Janusian Perspective," *Journal of Advertising*, 15 (4), 43-50+72.

Block, Peter H., Daniel L. Sherrell, and Nancy M. Ridgway (1986), "Consumer Search: An Extended Framework," *Journal of Consumer Research*, 13 (1), 119-126.

Bollen, Kenneth A., and Robert A. Stine (1992), "Bootstrapping Goodness-of-fit Measures in Structural Equation Models," *Sociological Methods and Research*, 21 (2), 205-229.

Bracken, Cheryl Campanella (2005), "Presence and Image Quality: The Case of High-Definition Television," *Media Psychology*, 7 (2), 191-205.

Bretz, Rudy (1983), *Media for Interactive Communication*, Beverly Hills, CA: Sage.

Briggs, Rex, and Nigel Hollis (1997), "Advertising on the Web: Is There Response before Click-Through?" *Journal of Advertising Research*, 37 (2), 33-45.

Broach, V. Carter, Thomas J. Page, and R. Dale Wilson (1995), "Television Programming and Its Influence on Viewers' Perceptions of Commercials: The Role of Program Arousal and Pleasantness," *Journal of Advertising*, 24 (4), 45-54.

Bronner, Fred, and Peter Neijens (2006), "Audience Experiences of media Context and Embedded Advertising," *International Journal of Market Research*, 48 (1), 81-100.

Bronner, Fred, Stephan van Velthoven, and Vincent Kuijpers (2005), "Media Experience and Advertising Experience: Application of a Multi-Media Research Tool," *Worldwide Readership Research Symposium*, 6, 145-156.

Brown, Mark (2002), "The Use of Banner Advertisements with Pull-Down Menus: A Copy Testing Approach," *Journal of Interactive Advertising*, 2 (2), 57-65.

Carver, Charles S., and Michael F. Scheier (1981), *Attention and Self-regulation: A Control Theory Approach to Human Behavior*. New York: Springer Press.

Chen, Jenova (2007), "Flow in Games (and Everything Else)," *Communications of the ACM*, 50 (4), 31-34.

Cho, Chang-Hoan (1999), "How Advertising Works on the WWW: Modified Elaboration Likelihood Model," *Journal of Current Issues and Research in Advertising*, 21 (1), 33-50.

Cicero, M. Tullii (1914), *De Finibus Bonorum et Malorum*, Cambridge, MA: Harvard Press.

Cohen, Sandy (2009), "James Cameron, Peter Jackson Talk Future of Film," *ABC News* (July 25), available at http://abcnews.go.com/Entertainment/wireStory?id=8171899 (accessed August 20, 2009).

Constantin, Corina and Dan Grigorovici (2004), "Novelty, Habituation or Structural Features? A Test of Competing Explanations for the Cognitive and Attitudinal Effects of Animated 3D Advertising on the Web," in Proceedings of the 2004 American Academy of Advertising Conference, Patricia Rose, ed.

Contrino, Phil (2009), "The Future of Cinema Advertising," Box Office (February 24), available at http://boxoffice.com/featured_stories/2009/02/the-future-of-cinema-advertisi.php (accessed August 20, 2009).

Coyle, James R., and Esther Thorson (2001), "The Effects of Progressive Levels of Interactivity and Vividness in Web Marketing Sites," *Journal of Advertising*, 30 (3), 65-77.

Cramer, Duncan, and Dennis Laurence Howitt (2005), *The SAGE Dictionary of Statistics: A Practical Resource for Students in the Social Science*, 3rd eds., Thousand Oaks, CA: SAGE Publications.

Csikszentmihalyi, Mihaly (1988), "The Flow Experience and Its Significance for Human Psychology," in *Optimal Experience: Psychological Studies of Flow in Consciousness*, Mihaly Csikszentmihalyi and Isabella S. Csikszentmihalyi, eds., New York: Cambridge University Press, 15-35.

Csikszentmihalyi, Mihaly (1990), *Flow: The Psychology of Optimal Experience*, London: Harper Perennial.

Csikszentmihalyi, Mihaly (1993), *The Evolving Self: A Psychology for the Third Millennium*, New York: Harper Perennial.

Daugherty, Terry, Hairong Li, and Frank Biocca (2005), "Experiential Ecommerce: A Summary of Research Investigating the Impact of Virtual Experience on Consumer Leaning," in *Online Consumer Psychology: Understanding and Influencing Consumer Behavior in the Virtual World* , Curtis P. Haugtvedt, Karen A. Machleit, and Richard F. Yalch, eds., Hillsdale, NJ: Lawrence Erlbaum Associates, 457-490.

Daugherty, Terry, Hairong Li, and Frank Biocca (2008), "Consumer Learning and the Effects of Virtual Experience Relative to Indirect and Direct Product Experience," *Psychology & Marketing*, 25 (July), 568-586.

Day, H. I. (1982), "Curiosity and the Interested Explorer," *Performance and Instruction*, 21 (4), 19-22.

Deci, Edward L. (1975), *Intrinsic Motivation*, New York: Plenum.

Deci, Edward L., and Richard M. Ryan (1985), *Intrinsic Motivation and Self-Determination in Human Behavior*, New York: Plenum.

Dodgson, Neil A. (2005), "Autostereoscopic 3D Displays," *Computer*, 38 (August), 31-36.

Donohew, Lewis, Philip Palmgree, Elizabeth Lorch, Rick Zimmerman, and Nancy Harrington (2002), "Attention, Persuasive Communication, and Prevention," in *Mass Media and Drug Prevention: Classic and Contemporary Theories and Research*, William D. Crano, and Michael Burgoon, Lahwah, NJ: Lawrence Erlbaum, 119-144.

Downes, Edward J., and Sally J. McMillan (2000), "Defining Interactivity: A Qualitative Identification of Key Dimensions," *New Media and Society*, 2 (2), 157-179.

Ducoffe, Robert H. (1996), "Advertising Value and Advertising on the Web," *Journal of Advertising Research*, 36 (5), 21-35.

Duncan, Calvin P., and James E. Nelson (1985), "Effects of Humor in a Radio Advertising Experiment," *Journal of Advertising*, 14 (2), 33-40 + 64.

Easterbrook, R. A. (1959), "Effects of Emotion on Cues Utilization and Organization of Behavior," *Psychological Review*, 66 (3), 183-201.

Edell, Julie, and Marian C. Burke (1987), "The Power of Feelings in Understanding Advertising Effects," *Journal of Consumer Research*, 14 (3), 421-433.

Edwards, Steven M., and Harshavardhan Gangadharbatla (2001), "The Novelty of 3D Product Presentations Online," *Journal of Interactive Advertising*, 2 (1), 10-18.

Fazio, Russell H., Mark P. Zanna, and Joel Cooper (1978), "Direct Experience and Attitude-Behavior Consistency: An Information Processing Analysis," *Personality and Social Psychology Bulletin*, 4 (1), 48-51.

Feick, Lawrence F., and Linda L. Price (1987), "The Market Maven: A Diffuser of Market Information," *Journal of Marketing*, 51 (1), 83-97.

Fishbein, Martin, and Icek Ajzen (1975), *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*, Reading, MA: Addison-Wesley.

Flavell, John H. (1977), *Cognitive Development*, Englewood Cliffs, NJ: Prentice-Hall.

Flynn, Leisa, Ronald Goldsmith, and Jacqueline Eastman (1996), "Opinion Leaders and Opinion Seekers: Two New Measurement Scales," *Journal of the Academy of Marketing Science, 24* (2), 137-147.

Fontaine, Gary (1992), "The Experience of a Sense of Presence in Intercultural and International Encounters," *Presence: Teleoperators and Virtual Environments*, 1 (4), 482-490.

Fornell, Claes, and David F. Larcker (1981), "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error," *Journal of Marketing Research*, 18 (3), 382-388.

Fredrickson, Barbara L. (1998), "What Good are Positive Mmotions?" *Review of General Psychology*, 2 (3), 300–319.

Friestad, Marian, and Peter Wright (1994), "The Persuasion Knowledge Model: How People Cope with Persuasion Attempts," *Journal of Consumer Research*, 21 (1), 1-31.

Gatignon, Hubert, and Thomas S. Robertson (1985), "A Propositional Inventory for New Diffusion Research," *Journal of Consumer Research*, 11 (4). 849-867.

Goldberg, Marvin E., and Gerald J. Gorn (1987), "Happy and Sad TV Programs: How They Affect Reactions to Commercials," *Journal of Consumer Research*, 14 (3), 387-403.

Goldsmith, Ronald E., and Charles F. Hofacker (1991), "Measuring Consumer Innovativeness," *Journal of the Academy of Marketing Science*, 19 (3), 209-221.

Greenwald, Anthony G., and Clark Leavitt (1984), "Audience involvement in Advertising: Four Levels," *Journal of Consumer Research*, 11 (1), 581-592.

Grigorovici, Dan M., and Corina D. Constantin (2004), "Experiencing Interactive Advertising beyond Rich Media: Impacts of Ad Type and Presence on Brand Effectiveness in 3D Gaming Immersive Virtual Environments," *Journal of Interactive Advertising*, 5 (1), 22-36.

Grimm, Laurence G., and Paul R. Yarnold (1995), *Understanding Multivariate Statistics*, Washington, DC: American Psychological Association.

Grunert, Klaus G. (1996), "Automatic and Strategic Processes in Advertising Effects," *Journal of Marketing*, 60 (4), 88-101.

Ha, Louisa, and E. Lincoln James (1998), "Interactivity Re-examined: A Baseline Analysis of Early Business Websites," *Journal of Broadcasting and Electronic Media*, 42 (4), 457-474.

Haberland, Gabriele S., and Peter A. Dacin (1992), "The Development of a Measure to Assess Viewers' Judgments of the Creativity of an Advertisement: A Preliminary Study," in *Advances in Consumer Research,* vol. 19, John Sherry and Brian Sternthal, eds., Provo, UT: Association for Consumer Research, 817-825.

Hair, Joseph F., Rolph E. Anerson, Ronald L. Tatham, and William C. Black (1998), *Multivariate Data Analysis*, 5th ed., Upper Saddle River, NJ: Prentice Hall.

Heeter, Carrie (1989), "Implications of New Interactive Technologies for Conceptualizing Communication," in *Media Use in the Information Age: Emerging Patterns of Adoption and Computer Use*, Jerry L. Salvaggio, and Jennings Bryant, eds., Hillsdale, NJ: Lawrence Erlbaum, 217-235.

Heeter, Carrie (1992), "Being There: The Subjective Experience of Presence," *Presence: Teleoperators and Virtual Environments*, 1 (2), 262-271.

Heeter, Carrie (1995), "Communication Research on Consumer VR," in *Communication in the Age of Virtual Reality,* Frank Biocca, and Mark R. Levy, ed., Hillsdale, NJ: Lawrence Erlbaum Associates, 191-218.

Heeter, Carrie, (2000), "Interactivity in the Context of Designed Experiences," *Journal of Interactive Advertising*, 1 (1), 4-15.

Hirschman, Elizabeth C. (1980), "Innovativeness, Novelty Seeking, and Consumer Creativity," *Journal of Consumer Research*, 7 (3), 283-295.

Hoffman, Donna L., and Thomas P. Novak (1996), "Marketing in Hypermedia Computer-Mediated Environments: Conceptual Foundations," *Journal of Marketing*, 60 (3), 50-68.

Hovland, Roxanne, and Gary B. Wilcox (1989), *Advertising and Society: Classic and Contemporary Readings on Advertising's Role in Society*, Lincolnwood, IL: NTC Business Books.

Insight Media (2010), "2010 3DTV Forecast Report: A Comprehensive Worldwide Forecast of 3D Television Unit Sales by Region and Technology," *Insight Media*, available at http://www.insightmedia.info/reports/20103dtvdetails.php (accessed March 1, 2010).

Ivory, James D., and Robert G. Magee (2009), "You Can't take it with You? Effects of Handheld Portable Media Consoles on Physiological and Psychological Responses to Video Game and Move Content," *CyberPsychology and Behavior*, 12 (3), 291-297.

Jeandrain, Anne-Cécile (2001), "Consumer Reactions in a realistic Virtual Shop: Influence on Buying Style," *Journal of Interactive Advertising*, 2 (1), 2-9.

Jee, Joonhyung, and Wei-Na Lee (2002), "Antecedents and Consequences of Perceived Interactivity: An Exploratory Study," *Journal of Interactive Advertising*, 3 (1), 34-45.

Jin, Zhao Xia, Ya Jun Zhang, Xin Wang, and Thomas Plocher (2007), "Evaluating the Usability of an Auto-stereoscopic Display," *Human-Computer Interaction*, Part II, HCII, LNCS 4551, 605-614.

Johnson, David M. (2005), "Introduction to and review of Simulator Sickness Research," *U.S. Army Research Institute for the Behavioral and Social Sciences*, Research Report 1832, April.

Johnson, Sarah (2009), "3D Screens could further Boost the Appeal of Cinema Advertising," Marketing Magazine (April 15), available at http://www.marketingmagazine.co.uk/news/898259/3D-screens-further-boost-appeal-cinema-advertising/ (accessed August 20, 2009).

Kashdan, Todd B., Paul Rose, and Frank D. Fincham (2004), "Curiosity and Exploration: Facilitating Positive Subjective Experiences and Personal Growth Opportunities," *Journal of Personality Assessment*, 82 (3), 291-305.

Katz, Elihu, Jay G. Blumler, and Michael Gurevitch (1974), "Uses and Gratifications Research," *Public Opinion Quarterly*, 37 (4), 509-523.

Katz. Elihu, and Paul F. Lazarsfeld (1955), *Personal Influence*, New York: Free Press.
Kawai, Takashi (2002), "3D Displays and Applications," *Displays*, 23, (1-2), 49-56.

Kelloway, Kevin E. (1998), *Using LISREL for Structural Equation Modeling: a Researcher's Guide*, Thousand Oacks, CA: Sage.

Kennedy, Robert. S., Norman E. Lane, Kevin S. Berbaum, and Michael G. Lilienthal (1993), "Simulator Sickness Questionnaire: An Enhanced Method for Quantifying Simulator Sickness," *The International Journal of Aviation Psychology*, 3 (3), 203-220.

Kent, Robert J., and Chris T. Allen (1994), "Competitive Interference Effects in Consumer Memory for Advertising: The Role of Brand Familiarity," *Journal of Marketing*, 58 (3), 97-105.

Kilgour, Mark (2006), "Improving the Creative Process: Analysis of the Effects of Divergent Thinking Techniques and Domain Specific Knowledge on Creativity," *International Journal of Business and Society*, 7 (2), 79-108.

Kim, Taeyong, and Frank Biocca (1997), "Telepresence via Television: Two Dimensions of Telepresence may have Different Connections to Memory and Persuasion," *Journal of Computer-Mediated Communication*, available at http://jcmc.indiana.edu/vol3/issue2/kim.html (accessed March 1, 2010).

Kiousis, Spiro (2002), "Interactivity: A Concept Explication," *New Media and Society*, 4 (3), 355-383.

Klein, Lisa R. (2003), "Creating Virtual Product Experiences: The Role of Telepresence," *Journal of Interactive Marketing*, 17 (Winter), 41-55.

Ko, Hanjun, Chang-Hoan Cho, and Marilyn S. Roberts (2005), "Internet Uses and Gratifications: A Structural Equation Model of Interactive Advertising," *Journal of Advertising*, 34 (2), 57-70.

Koppe, I. (1998), "Literature Study Media Experience," in *Theme Dossier Media Experience*, Amsterdam: Platform '95, III-1-III-109.

Kover, Arthur J., and William L. James (1993), "When do Advertising 'Power Words' Work? An Examination of Congruence and Satiation," *Journal of Advertising Research*, 33 (4), 32-39.

Krugman, Herbert E. (1965), "The Impact of Television Advertising: Learning Without Involvement," *The Public Opinion Quarterly*, 29 (3), 349-356.

Krugman, Herbert E. (1977), "Memory without Recall, Exposure without Perception," *Journal of Advertising Research*, 17 (4), 7-12.

Lamb, Gregory M. (2005), "Return of 3-D and No Goofy Glasses," *The Christian Science Monitor* (April 21), available at http://www.csmonitor.com/2005/0421/p14s02-stct.htm (accessed April 1, 2010).

Lang, Annie (2000), "The Limited Capacity Model of Mediated Message Processing," *Journal of Communication*, 50 (1), 46-70.

LaViola, Joseph J. Jr. (2000), "A Discussion of Cybersickness in Virtual Environments," *SIGCHI Bulletin*, 32 (January), 47-56.

Lee, Kwan Min (2004), "Presence, Explicated," *Communication Theory*, 14 (1), 27-50.

Lee, Wei-Na, and Sejung Marina Choi (2006), "The Role of Horizontal and Vertical Individualism and Collectivism in Online Consumers' Responses Toward Persuasive Communication on the Web," *Journal of Computer-Mediated Communication*, 11 (1), 317-336.

Lessiter, Jane, Jonathan Freeman, Edmund Koegh, and Jules Davidoff (2001), "A Cross-Media Presence Questionnaire: The ITC-Sense of Presence Inventory," *Presence: Teleoperators and Virtual Environments*, 10 (3), 282-297.

Li, Hairong, Terry Daugherty, and Frank Biocca (2002), "Impact of 3-D Advertising on Product Knowledge, Brand Attitude, and Purchase Intention: The Mediating Role of Presence," *Journal of Advertising*, 31 (3), 43-57.

Li, Hairong, Terry Daugherty, and Frank Biocca (2003), "The Role of Virtual Experience in Consumer Learning," *Journal of Consumer Psychology*, 13 (4), 395-407.

Lichtenstein, Donald R., Richard G. Netemeyer, Scot Burton (1990), "Distinguishing Coupon Proneness from Value Consciousness: An Acquisition-Transaction Utility Theory Perspectives," *Journal of Marketing*, 54 (3), 54-67.

Lin, James Jeng-Weei, Henry B.L. Duh, Donald E. Parker, Habib Abi-Rached, Thomas A. Furness (2002), "Effects of Field of View on Presence, Enjoyment, Memory, and Simulator Sickness in a Virtual Environment," in *Proceedings of the IEEE Virtual Reality*, 996519 (March), 164-171.

Litman, Jordan A., and Charles D. Spielberger (2003), "Measuring Epistemic Curiosity and its Diversive and Specific Components," *Journal of Personality Assessment*, 80 (1), 75-86.

Loewenstein, George (1994), "The Psychology of Curiosity: A Review and Reinterpretation," *Psychological Bulletin*, 116 (1), 75-98.

Lombard, Matthew (1995), "Direct Responses to People on the Screen: Television and Personal Space," *Communication Research*, 22 (3), 288-324.

Lombard, Matthew, and Jennifer Snyder-Duch (2001), "Interactive Advertising and Presence: A Framework," *Journal of Interactive Advertising*, 1 (2), 56-65.

Lombard, Matthew, and Theresa B. Ditton (1997), "At the Heart of It All: The Concept of Presence," *Journal of Computer-Mediated Communication*, 3 (September), available at http://jcmc.indiana.edu/vol3/issue2/lombard.html (accessed August 20, 2009).

Lombard, Matthew, and Theresa B. Ditton (2001), "Measuring Presence: A Literature-based Approach to the Development of a Standardized Paper and Pencil Instrument," *Paper presented at Presence 2001: The third international workshop on presence, Philadelphia*.

Lombard, Matthew, Robert D. Reich, Maria Elizabeth Grabe, Cheryl Campanella Bracken, and Theresa Bolmarcich Ditton (2000a), "Presence and Television: The Role of Screen Size," *Human Communication Research*, 26 (1), 75-98.

Lombard, Matthew, Theresa B. Ditton, Daliza Crane, Bill Davis, Gisela Gil-Egui, Karl Horvath, and Jessica Rossman (2000b), "Measuring Presence: A Literature-Based Approach to the Development of a Standardized Paper-And-Pencil Instrument," *Project abstract submitted for presentation at Presence 2000: The Third International Workshop on Presence*, available at http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.132.4737&rep=rep1&type=pdf (accessed April 1, 2010).

Lutz, Kathy A., and Richard J. Lutz (1977), "Effects of Interactive Imagery on Learning: Application to Advertising," *Journal of Applied Psychology*, 62 (4), 493-498.

Lyons, Barbara, and Kenneth Henderson (2005), "Opinion Leadership in a Computer-Mediated Environment," *Journal of Consumer Behaviour*, 4 (5), 319-329.

Macias, Wendy (2003), "A Preliminary Structural Equation Model of Comprehension and Persuasion of Interactive Advertising brand Web Sites," *Journal of Interactive Advertising*, 3 (2), 36-48.

Macias, Wendy (2003), "A Preliminary Structural Equation Model of Comprehension and Persuasion of Interactive Advertising brand Web Sites," *Journal of Interactive Advertising*, 3 (2), 36-48.

MacInnis, Deborah J., and Bernard J. Jaworski (1989), "Information Processing from Advertisements: Toward an Integrative Framework," *Journal of Marketing*, 53 (4), 1-23.

Maddox, Lynda M., Darshan Mehta, and Hugh G. Daubek (1997), "The Role and Effect of Web Addresses in Advertising," *Journal of Advertising Research*, 37 (2), 47-59.

Malthouse, Edward C., Bobby J. Calder, and Wayne P. Eadie (2003), "Conceptualizing and Measuring Magazine Reader Experiences," *Worldwide Readership Research Symposium*, 11, 285-299.

Mangin, Jean-Pierre Lévy, and Arantxa Sulé Alonso, "Rescaling and Transforming Continuous Non-Normal Data in Covariance Structure Analysis: An Essay of Taxonomy," *Ciencia Ergo Sum*, 13 (002), 126-132.

Marks, Lawrence, and Michael Kamins (1988), "The Use of Product Sampling and Advertising: Effects of Sequence of Exposure and Degree of Advertising Claim Exaggeration on Consumers' Belief Strength, Belief Confidence and Attitudes," *Journal of Marketing Research*, 25 (3), 266-282.

Massetti, Brenda (1996), "An Empirical Examination of the Value of Creativity Support Systems on Idea Generation," *MIS Quarterly*, 20 (1), 83-97.

McGreevy, Michael W. (1992), "The Presence of Field Geologist in Mars-like Terrain," *Presence: Teleoperators and Virtual Environments*, 1 (4), 375-403.

Meyers-Levy, Joan, and Prashant Malaviya (1999), "Consumers' Processing of Persuasive Advertisements: An Integrative Framework of Persuasion Theories," *Journal of Marketing*, 63 (special issue), 45-60.

Midgley, David F., and Grahame R. Dowling (1978), "Innovativeness: The Concept and Its Measurement," *Journal of Consumer Research*, 4 (3), 229-242.

Mokhtarian, Patricia L., Ilan Salomon, and Lothlorien S. Redmond (2001), "Understanding the Demand for Travel: Its' Not Purely Derived," *Innovation: The European Journal of Social Science Research*, 14 (4), 355-380.

Moorman, Marjolein, Peter C. Neijens, and Edith G. Smith (2002), "The Effects of Magazine-Induced Psychological Responses and Thematic Congruence on Memory and Attitude Toward the Ad in a Real-Life Setting," *Journal of Advertising*, 31 (4), 27-40.

Muhlbach, Lothar, Martin Bocker, and Angela Prussog (1995), "Telepresence in Videocommunications: A Study on Stereoscopy and Individual Eye Contact," *Human Factors*, 37 (2), 290-305.

Myers, James H., and Thomas S. Robertson (1972), "Dimensions of Opinion Leadership," *Journal of Marketing Research*, 9 (1), 41-46.

Naimark, Michael (1990), "Realness and Interactivity," in *The Art of Human-Computer Interface Design*, Brenda Laurel, ed., Reading, MA: Addison-Wesley, 455-459.

Nakamura, Jeannem and Mihaly Csikszentmihalyi (2002), "The Concept of Flow," In *Handbook of Positive Psychology*, C. R. Snyder and Shane J. Lopez, eds., London: Oxford University Press, 89-105.

Nelson, Michelle R., Ronald A. Yaros, and Heejo Keum (2006), "Examining the Influence of Telepresence on Spectator and Player Processing of Real and Fictitious Brands in a Computer Game," *Journal of Advertising*, 35 (Winter), 87-99.

Nelson, Phillip (1970), "Information and Consumer Behavior," *Journal of Political Economy*, 78 (2), 311-329.

Nelson, Phillip (1974), "Advertising as Information," *Journal of Political Economy*, 82 (4), 729-754.

Neuman, William R. (1990), "Beyond HDTV: Exploring Subjective Responses to Very High Definition Television," A Research Report for GTE Labs and the TVOT Consortium MIT, Cambridge, MA.

Newhagen, John E., John W. Cordes, and Mark R. Levy (1995), "Nightly@nbc.com: Audience Scope and the Perception of Interactivity in Viewer Mail on the Internet," *Journal of Communication*, 45 (3): 164-175.

Nichols, Sarah, Clovissa Haldane, John R. Wilson (2000), "Measurement of Presence and Its Consequences in Virtual Environment," *International Journal of Human-Computer Studies*, 52 (March), 471-491.

Norris, Claire E., and Andrew M. Colman (1994), "Effects of Entertainment and Enjoyment of Television Programs on Perception and memory of Advertisements," *Social Behavior and Personality*, 22 (4), 365-376.

Novak, Thomas P., Donna L. Hoffman, and Yiu-Fai Yung (2000), "Measuring the Customer Experience in Online Environments: A Structural Modeling Approach", *Marketing Science*, 19 (1), 22-42.

Nysveen, Herbjørn, and Einar Breivik (2005), "The Influence of media on Advertising Effectiveness," *International Journal of Market Research*, 47 (4), 383-405.

Olney, Thomas J., Morris B. Holbrook, Rajeev Batra (1991), "Consumer Responses to Advertising: The Effects of Ad Content, Emotions, and Attitude toward the Ad on Viewing Time," *Journal of Consumer Research*, 17 (4), 440-453.

Pavlou, Paul A., and David W. Stewart (2000), "Measuring the Effects and Effectiveness of Interactive Advertising: A Research Agenda," *Journal of Interactive Advertising*, 1 (1), 62-78.

Pearson, Pamela H. (1970), "Relationships between Global and Specified Measures of Novelty Seeking," *Journal of Consulting and Clinical Psychology*, 34 (2), 199-204.

Petty, Richard E., and John T. Cacioppo (1981), *Attitudes and Persuasion: Classic and Contemporary Approaches*, Dubuque, IA: William C. Brown.

Petty, Richard E., John T. Cacioppo, and David Schumann (1983), "Central and Peripheral Routes to Advertising Effectiveness: The Moderating Role of Involvement," *Journal of Consumer Research*, 10 (2), 135-146.

Qian, Ning (1997), "Binocular Disparity and the Perception of Depth," *Neuron*, 18 (3), 359-368.

Rabin, Roni C. (2009), "Proximity to Fast Food a Factor in Student Obesity," New York Times, available at http://www.nytimes.com/2009/03/26/health/nutrition/26obese.html (accessed June 26, 2011).

Rafaeli, Sheizaf (1988) "Interactivity: From New Media to Communication," in *Advancing Communication Science: Merging Mass and Interpersonal Processes*, Robert P. Hawkins, John M. Wieman, and Suzanne Pingree, eds. , Newbury Park, CA: Sage, 110-134.

Reeves, Byron, Benjamin H. Detenber, and Jonathan Steuer (1993), "New Televisions: The Effects of Big Pictures and big Sound on Viewer Responses to the Screen," *Paper presented to the Information Systems Division of the International Communication Association, Washington, D.C.*

Rethans, Aron J., John L. Swasy, and Lawrence J. Marks (1986), "Effects of Television Commercial Repetution, Receiver Knowledge, and Commercial Length: A Test of the Two-Factor Model," *Journal of Marketing Research*, 23 (1), 50-61.

Reuters (2009), "3-D Advertising Comes to the Silver Screen: Screenvision and Wrigley® Partner to…," Reuters (May 1), available at http://www.reuters.com/article/pressRelease/idUS126480+01-May-2009+PRN20090501 (accessed August 20, 2009).

Rheingold, Howard (1991), *Virtual Reality*, New York, NY: Summit Books.
Rodgers, Shelly, and Esther Thorson (2000), "The Interactive Advertising Model: How Users Perceive and Process Online Ads," *Journal of Interactive Advertising*, 1 (1), 42-61.

Roehrich, Gilles (2004), "Consumer Innovativeness Concepts and Measurements," *Journal of Business Research*, 57 (6), 671-677.

Rogers, Everett M. (1962), *Diffusion of Innovations*, New York: The Free Press.

Rogers, Everett M., and F. Floyd Shoemaker (1971), *Communication of Innovations*, New York: The Free Press.

Rosbergen, Edward, Rik Pieters, and Michel Wedel (1997), "Visual Attention to Advertising: A Segment-Level Analysis," *Journal of Consumer Research*, 24 (3), 305-314.

Rosenkrans, Ginger (2009), "The Creativeness and Effectiveness of Online Interactive Rich Media Advertising," *Journal of Interactive Advertising*, 9 (2), 18-31.

Sadowski, Wallace, and kay Stanney (2002), "Presence in Virtual Environments," in *Handbook of Virtual Environments: Design, Implementation and Applications*, Kay M. Stanney, Mahwah, NJ: Lawrence Erlbaum Associates, 791-806.

Sawyer, Alan (1981), "Repetition, Cognitive Responses and Persuasion," in *Cognitive Responses in Persuasion*, Thomas M. Ostrom, Richard E. Petty, and Timothy C. Brock, ed. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 237-262.

Schlinger, Mary Jane (1979), "A Profile of responses to Commercials," *Journal of Advertising Research*, 19 (2), 37-48.

Schlosser, Ann E., and Sharon Shavitt (1999), "Survey of Internet Users' Attitude toward Internet Advertising," *Journal of Interactive Marketing*, 13 (3), 34-54.

Schneiderman, Ben (1987), *Designing the User Interface: Strategies for Effective Human-Computer Interaction,* Reading, MA: Addison-Wesley.

Schubert, Thomas, Frank Friedmann, and Holger Regenbrecht (2001), "The Experience of Presence: Factor Analytic Insights," *Presence: Teleoperators and Virtual Environments*, 266-281.

Schweizer, Tanja Sophie (2006), "The Psychology of Novelty-Seeking, Creativity and Innovation: Neurocognitive Aspects within a Work-Psychological Perspective," *Creativity and Innovation Management*, 15 (2), 164-172.

Severin, Werner J., and James W. Tankard, Jr. (2000), *Communication Theories: Origins, Methods, and Uses in the Mass Media*, 5th ed., New York: Addison Wesley Longman.

Shah, Agam (2009), "Digital Gear: A New Dimension to 3D," *PC World*, January 29, available at http://www.pcworld.com/article/158584/digital_gear_a_new_dimension_to_3d.html (accessed April 1, 2010).

Sheridan, Thomas B. (1992), "Musings on Telepresence and Virtual Presence," *Presence: Teleoperators and Virtual Environments*, 1 (1), 120-126.

Sherry, John L. (2004), "Flow and Media Enjoyment," *Communication Theory*, 14 (4), 328-347.

Shoham, Aviv, and Ayalla Ruvio (2008), "Opinion Leaders and Followers: A Replication and Extension," *Psychology and Marketing*, 25 (3), 280-297.

Smith, Daniel C., and C. Whan Park (1992), "The Effects of Brand Extensions on Market Share and Advertising Efficiency," *Journal of Marketing Research*, 29 (3), 296-313.

Smith, Robert E., and William R. Swinyard (1982), "Information Response Models: An Integrated Approach," *Journal of Marketing*, 46 (1), 81-93.

Smith, Robert E., and William R. Swinyard (1988), "Cognitive Response to Advertising and Tiral: Belief Strength, Belief Confidence and Product Curiosity," *Journal of Advertising*, 17 (3), 3-14.

So, Richard H. Y., Andy Ho., and W. T. Lo (2001), "A Metric to Quantify Virtual Scene movement for the Study of Cybersickness: Definition, Implementation, and Verification," *Presence: Teleoperators and Virtual Environments*, 10 (2), 193-215.

Spielberger, Charles, D., and Laura M. Starr (1994), "Curiosity and Exploratory Behavior," In *Motivation: Theory and Research*, Harold F. O' Neil Jr. and Michael Drillings, eds, Hillsdale, NJ: LEA, 221-243.

Steenkamp, Jan-Benedict E. M., and Hans Baumgartner (1992), "The Role of Optimum Stimulation Level in Exploratory Consumer Behavior," *Journal of Consumer Research*, 19 (3), 434-448.

Steuer, Jonathan (1992), "Defining Virtual Reality: Dimensions Determining Telepresence," *Journal of Communication*, 42 (Autumn), 73-93.

Sundar, S. Shyam, Sriram Kalyanaraman, and Justin Brown (2003), "Explicating Web Site Interactivity," *Communication Research*, 30 (1), 30-59.

Tellis, Gerad J. (1997), "Effective Frequency: One Exposure or Three Factors?" *Journal of Advertising Research*, 37 (4), 75-80.

Thorson, Esther, and Annie Lang (1992), "Effects of Television Videographics and Lecture Familiarity on Adult Cardiac Orienting Responses and Memory," *Communication Research*, 19 (3), 346-369.

Till, Brian D., and Daniel W. Baack (2005), "Recall and Persuasion," *Journal of Advertising*, 34 (3), 47-57.

Towell, John, and Elizabeth Towell (1997), "Presence in text-based networked virtual environments or 'MUDS'," *Presence: Teleoperators and Virtual Environments*, 6 (5), 590-595.

Triesman, Anne M. (1964), "Verbal Cues, Language, and Meaning in Selective Attention," *American Journal of Psychology*, 77 (2), 206-219.

Tsang, Melody M., Shu-Chu Ho, and Ting-Peng Liang (2004), "Consumer Attitudes toward Mobile Advertising: An Empirical Study," *International Journal of Electronic Commerce*, 8 (3), 65-78.

Turnbull, P. W., and A. Meenaghan (1980), "Diffusion of Innovation and Opinion Leadership," *European Journal of Marketing*, 14 (3), 3-33.

United Press International (2009), "First-ever 3-D Cinema Ad Released," United Press International (May 1), available at http://www.upi.com/Entertainment_News/2009/05/01/First-ever-3-D-cinema-ad-released/UPI-79691241204341/ (accessed August 20, 2009).

Vakratsas, Demetrios, and Tim Ambler (1999), "How Advertising Works: What Do We Really Know?" *Journal of Marketing*, 63 (1), 26-43.

Vaughn, Richard (1980), "How Advertising Works: A Planning Model," *Journal of Advertising Research*, 20 (5), 27-33.

Veblen, Thorstein (1899), *The Theory of the Leisure Class*, New York: Macmillan Company.

Vorderer, Peter, Christoph Klimmt, and Ute Ritterfeld (2004), "Enjoyment: At the Heart of Media Entertainment," *Communication Theory*, 14 (November), 388-408.

Voss, Hans-Georg, and Heidi Keller (1983), *Curiosity and Exploration: Theories and Results*, New York: Academic.

Watson, David, David Wiese, Jatin Vaidya, and Auke Tellegen (1999), "The Two General Activation Systems of Affect: Structural Findings, Evolutionary Considerations, and Psychobiological Evidence," *Journal of Personality and Social Psychology*, 76 (5), 820-838.

Waxman, Sharon (2007), "Top Directors See the Future, and They Say It's in 3-D," *The New York Times* (May 22), available at http://www.nytimes.com/2007/05/22/movies/22dime.html?scp=1&sq=Top%20Directors%20See%20the%20Future,%20and%20They%20Say%20It%E2%80%99s%20in%203-D&st=cse (accessed August 24).

Weiss, Patrice L., Debbie Rand, Noomi Katz, and Rachel Kizony (2004), "Video Capture Virtual Reality as a Flexible and Effective Rehabilitation Tool," *Journal of NeuroEngineering and Rehabilitation*, 1 (December), available at http://www.jneuroengrehab.com/content/1/1/12 (accessed August 20, 2009).

Welker, W. I. (1961), "An Analysis of Exploratory and Play Behavior in Animals," In *Functions of Varied Experience*, Donald W. Fiske and Salvatore R. Maddi, eds, Homewood, IL: Dorsey Press, 43-69.

West, Douglas C., Arthur J. Kover, and Albert Caruna (2008), "Practitioner and Customer Views of Advertising Creativity," *Journal of Advertising*, 37 (4), 35-45.

White, Alisa,and Bruce L. Smith (2001), "Assessing Advertising Creativity Using the Creative Product Semantic Scale," *Journal of Advertising Research*, 41 (6), 27-34.

White, Robert W. (1959), "Motivation Reconsidered: The Concept of Competence," *Psychological Review*, 66 (5), 297-333.

Williams, Frederick, Ronald E. Rice, and Everett M. Rogers (1988), *Research Methods and the New Media*. New York: Free Press.

Wilson, F.A.W., and E.T. Rolls (1993), "The Effects of Stimulus Novelty and Familiarity on Neuronal Activity in the Amygdala of Monkeys Performing Recognition Memory Tasks," *Experimental Brain Research*, 93 (3), 367-382.

Witmer, Bob G., and Michael J. Singer (1998), "Measuring Presence in Virtual Environments: A Presence Questionnaire", *Presence: Teleoperators and Virtual Environments*, 7 (3), 225-240.

Wolman, Benjamin B. (1989), *Dictionary of Behavioral Science*, 2nd ed., San Diego, CA: Academic Press.

Wolverton, Troy (2009), "3D Movies Making a Comeback," *The Mercury News* (August 21), available at http://www.mercurynews.com/businessheadlines/ci_13169728 (accessed August 24, 2009).

Wu, Guohua (2005), "The Mediating Role of Perceived Interactivity in the Effect of Actual Interactivity on Attitude toward the Website," *Journal of Interactive Advertising*, 5 (2), 29-39.

Yim, Mark Yi-Cheon, and Terry Daugherty (2008, August), "The Impact of Stereoscopic 3-D Advertising on Consumer Attitudes: An Exploratory Study," Presented at the annual conference of Association for Education in Journalism and Mass Communication in Chicago, IL.

Yim, Mark Yi-Cheon, and Terry Daugherty (2009, March), "Delivering Stereoscopic 3-D Technology to Advertising: An Exploratory Study," Presented at the annual conference of American Academy of Advertising in Cincinnati, OH.

Zahorik, Pavel, and Rick L. Jenison (1998), "Presence as Being-in-the-World," *Presence: Teleoperators and Virtual Environments*, 7 (1), 78-89.

Zaichkowsky, Judith Lynne (1985), "Measuring the Involvement Construct," *Journal of Consumer Research*, 12 (3), 341-352.

Zajonc, R. B. (1980), "Feeling and Thinking: Preferences Need No Inferences," *American Psychologist*, 35 (2), 151-175.

Zeltzer, David (1992), "Presence: Teleoperators and Virtual Environments," *Presence: Teleoperators and Virtual Environments*, 1 (1), 127-132.

Zhang, Yong (1996), "Responses to Humorous Advertising: The Moderating Effect of Need for Cognition," *Journal of Advertising*, 25 (1), 15-32.

Zillmann, Dolf (1996), "Sequential Dependencies in Emotional Experience and Behavior," in Emotion: Interdisciplinary Perspectives, Robert D. Kavanaugh, Betty

Zimmerberg, Steven Fein, and Betty Zimmerberg-Glick, eds, Mahwah, NJ: Erlbaum, 243-272.

VITA

(Mark) Yi-Cheon Yim earned a B.A. degree in German language and literature from Korea University in Seoul and an M.S. degree in Advertising from the University of Illinois at Urbana-Champaign. After graduation, he worked for Cheil Worldwide, Inc., a Samsung in-house agency in Seoul, Korea, as an account planner. In 2006, he entered the Graduate School of the University of Texas at Austin. While pursuing his doctoral degree, he worked on projects exploring how new technology can be effectively adopted as a marketing communication tool with prominent companies, such as CJ Powercast and Pavonine Korea. He is currently an assistant professor of Management and Marketing at the Richard J. Wehle School of Business at Canisius College in Buffalo, NY (yimy@canisius.edu).

This manuscript was typed by the author.